7, 1948 HNOLOGY DEPARTMENT

Gas Journal

Vol. 254. 100th Year. LONDON, APRIL 14, 1948. No. 4428. Price 1/-

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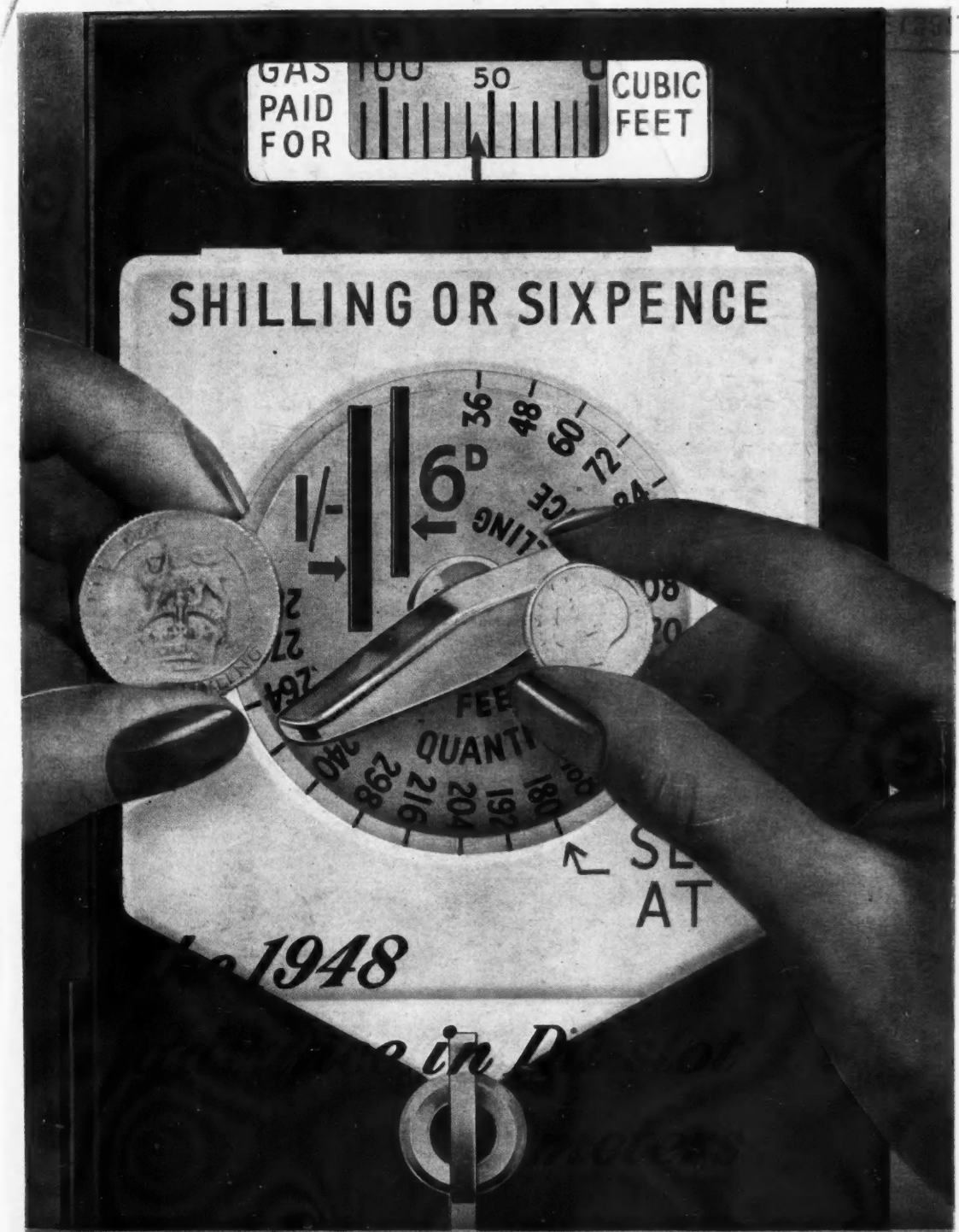

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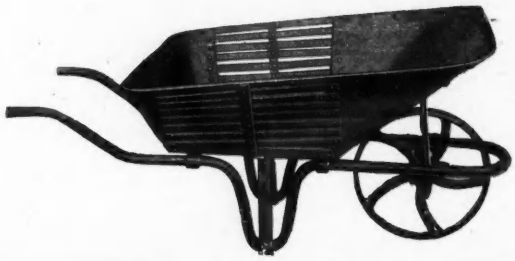

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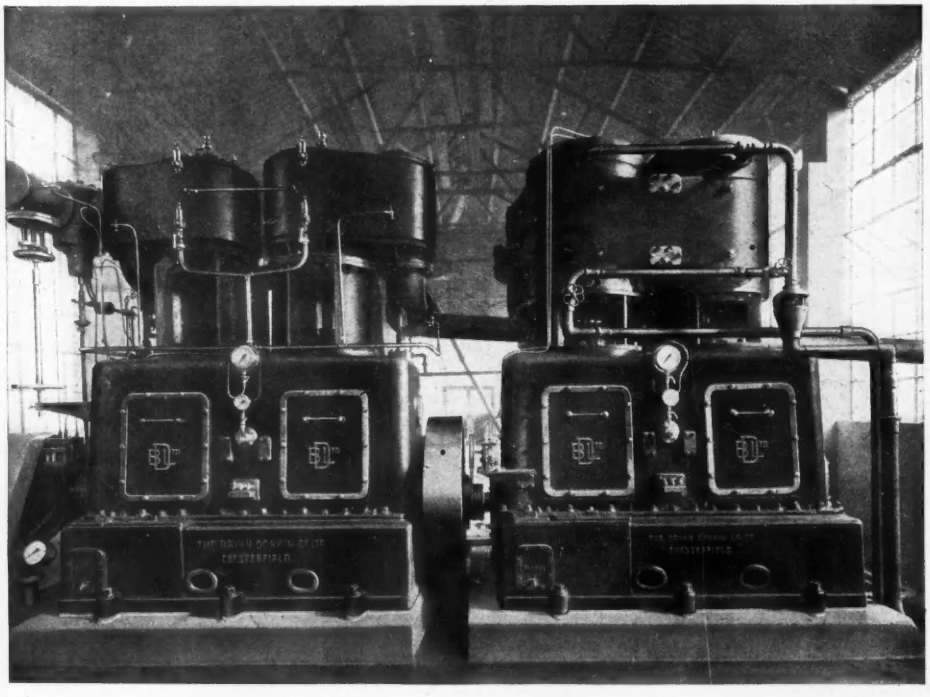

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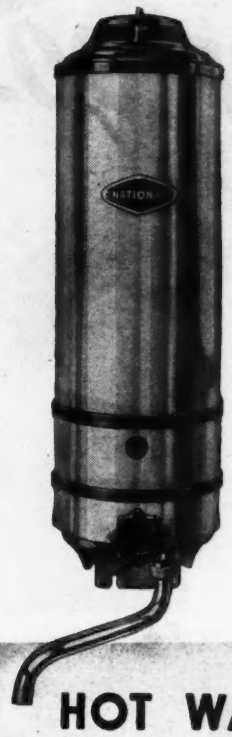

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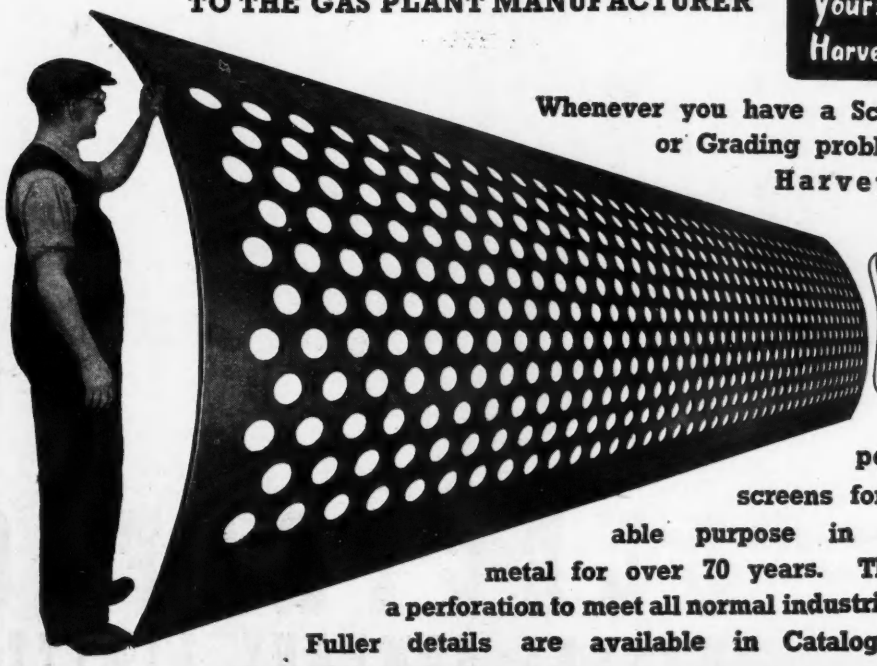

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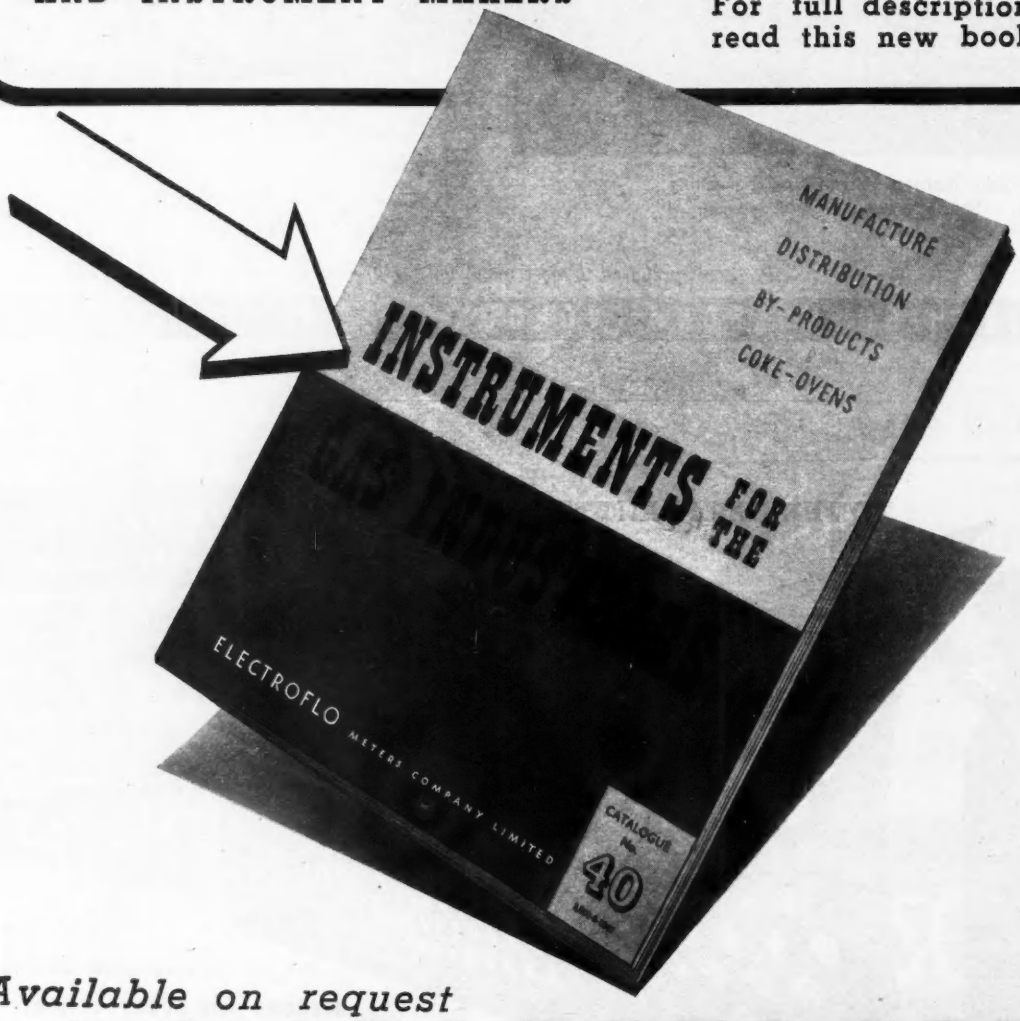

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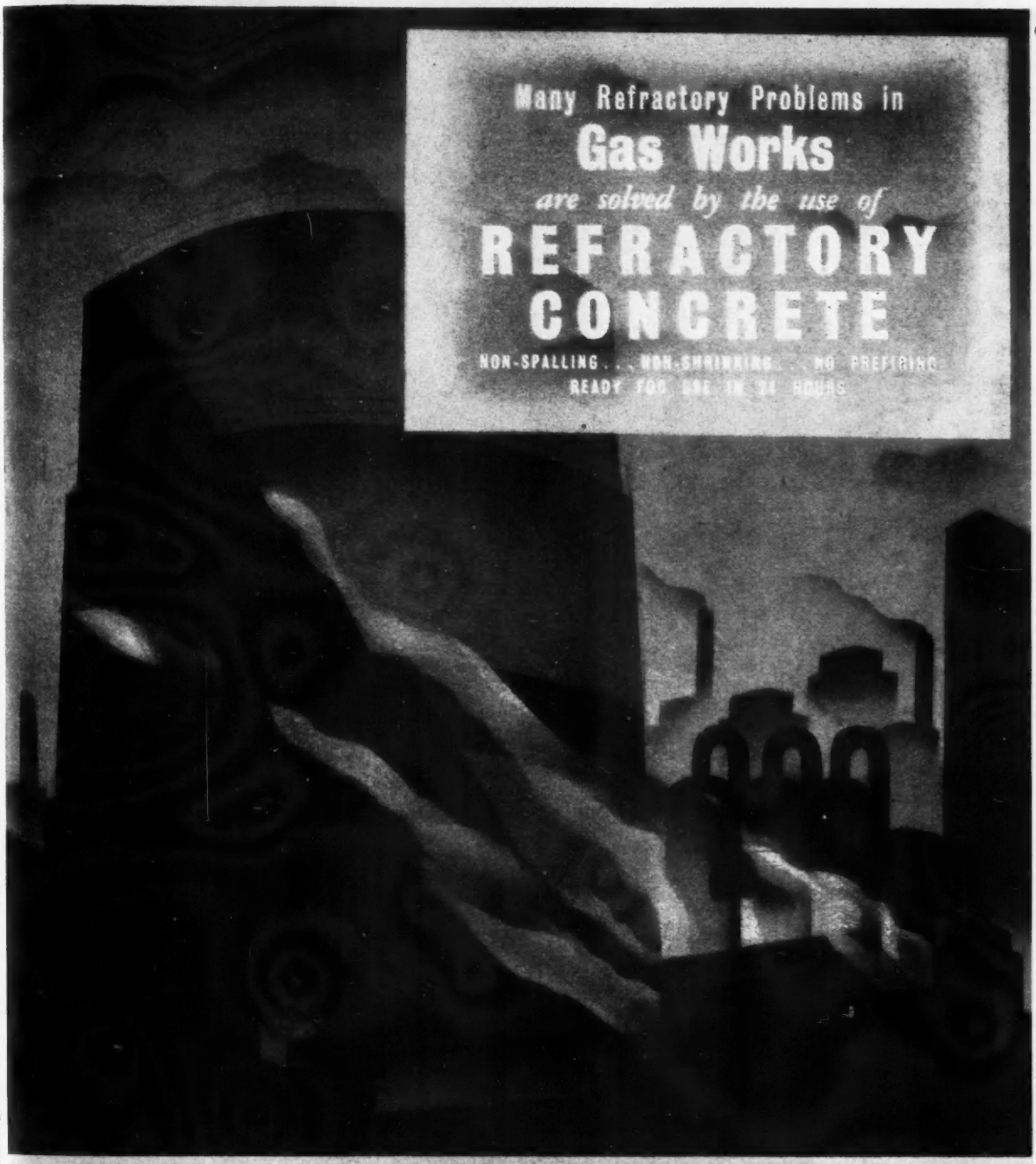
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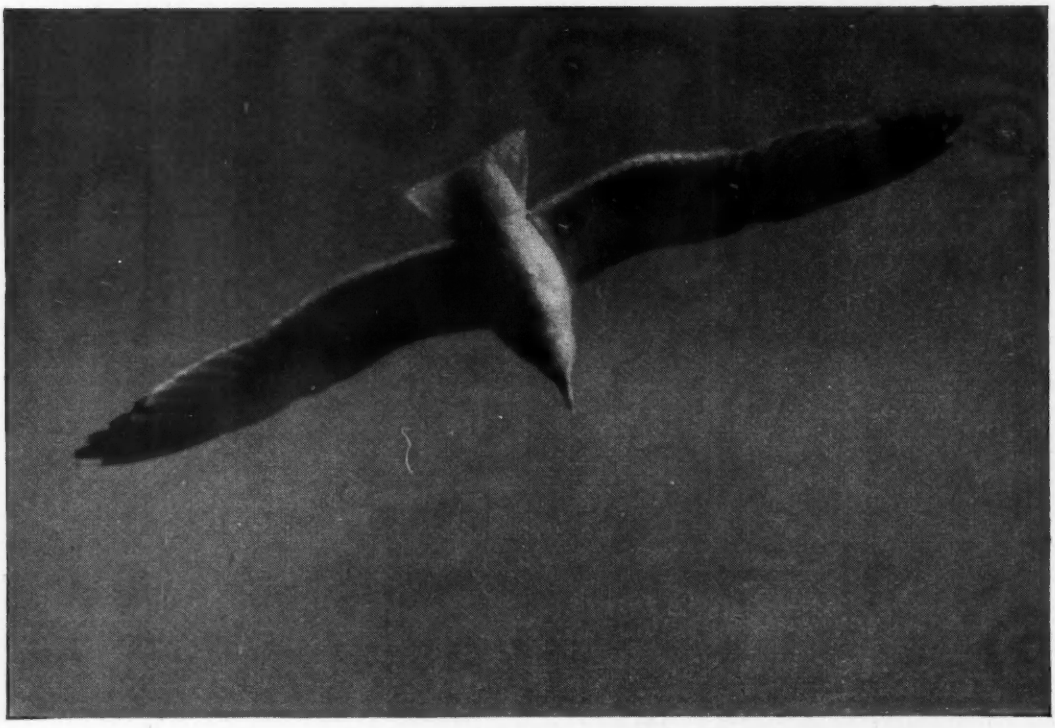

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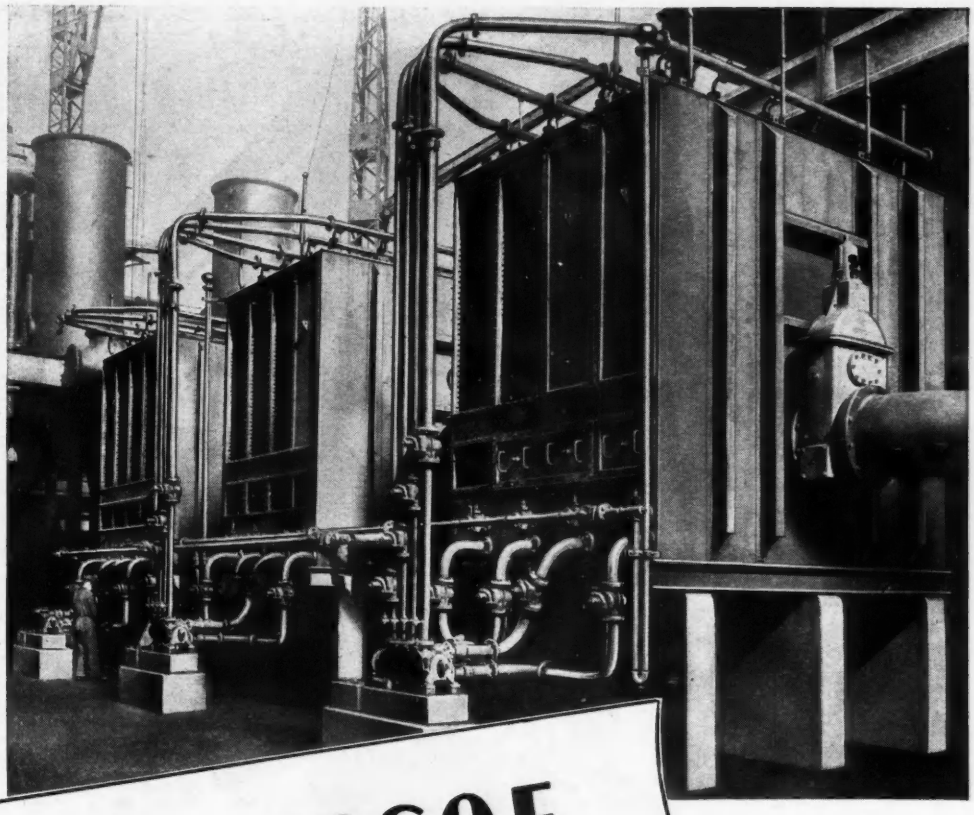

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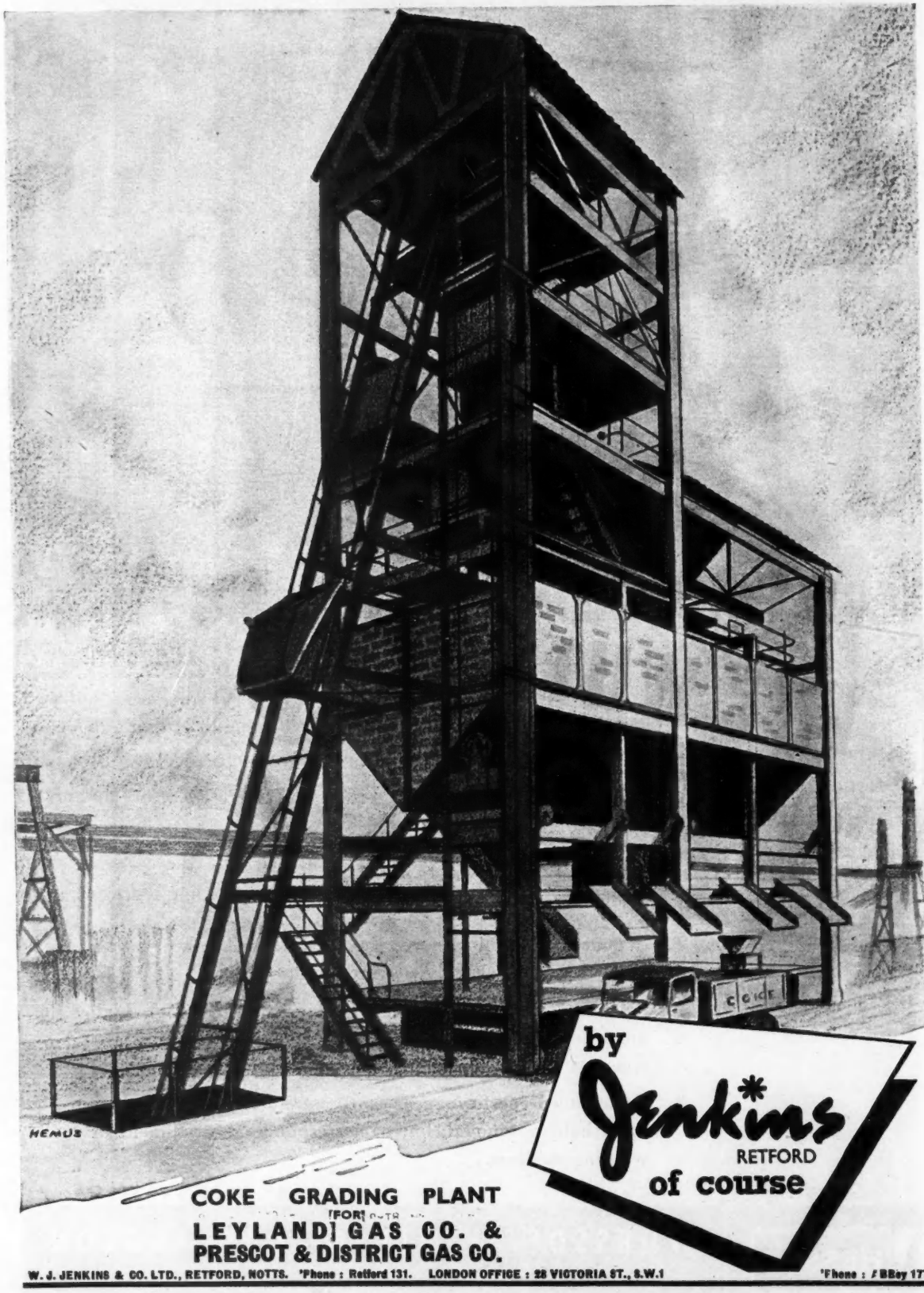
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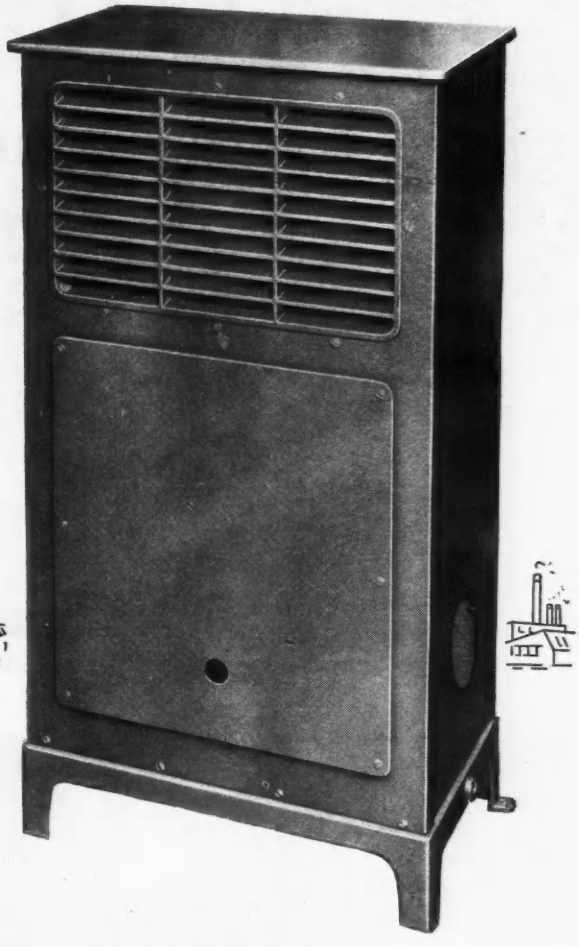

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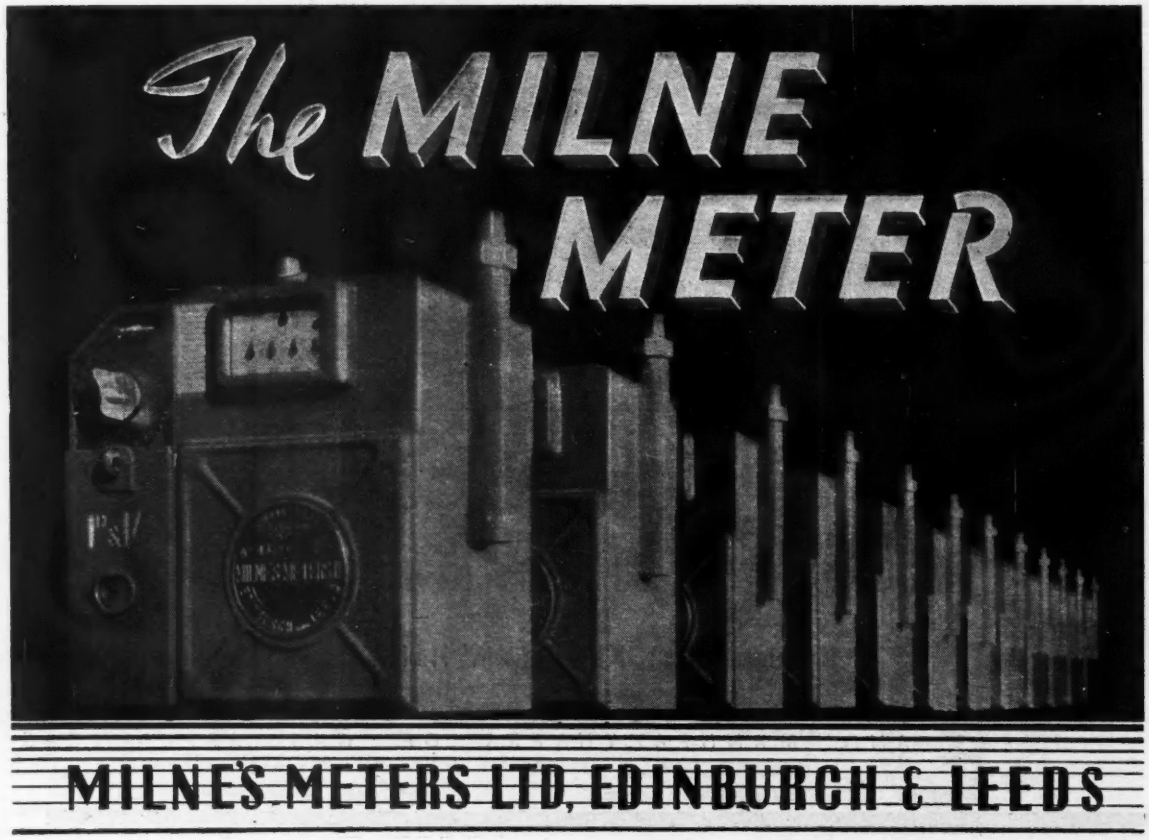

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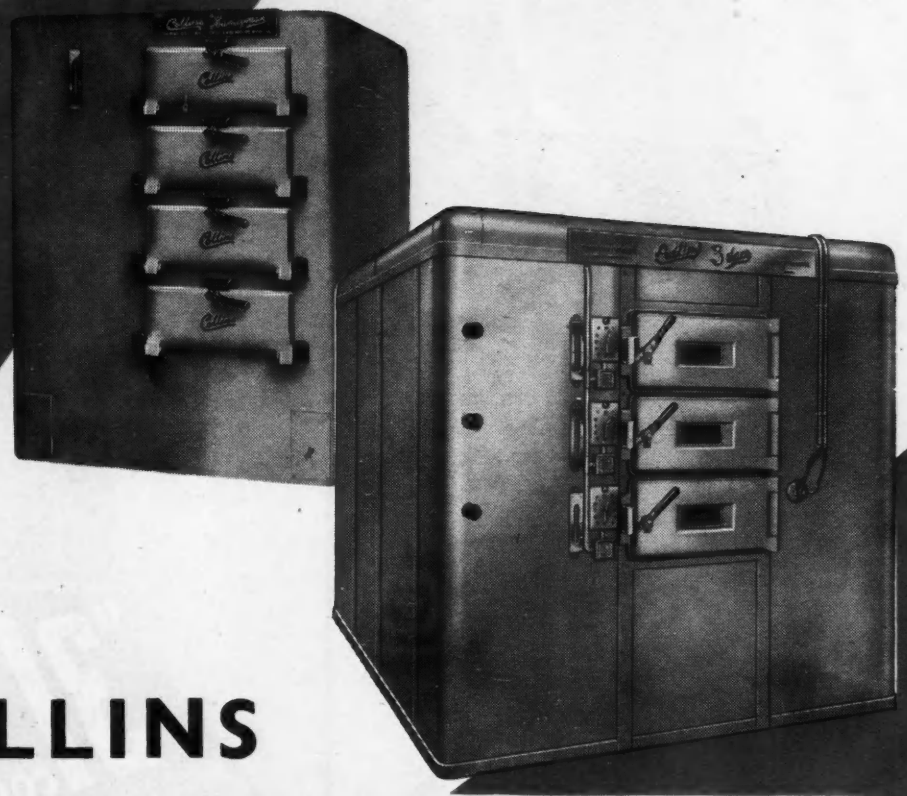

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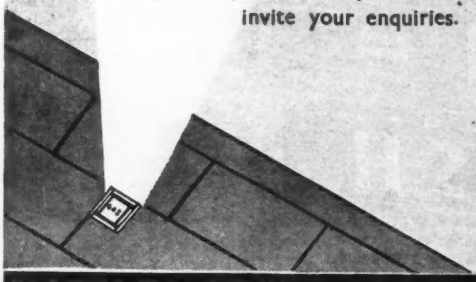

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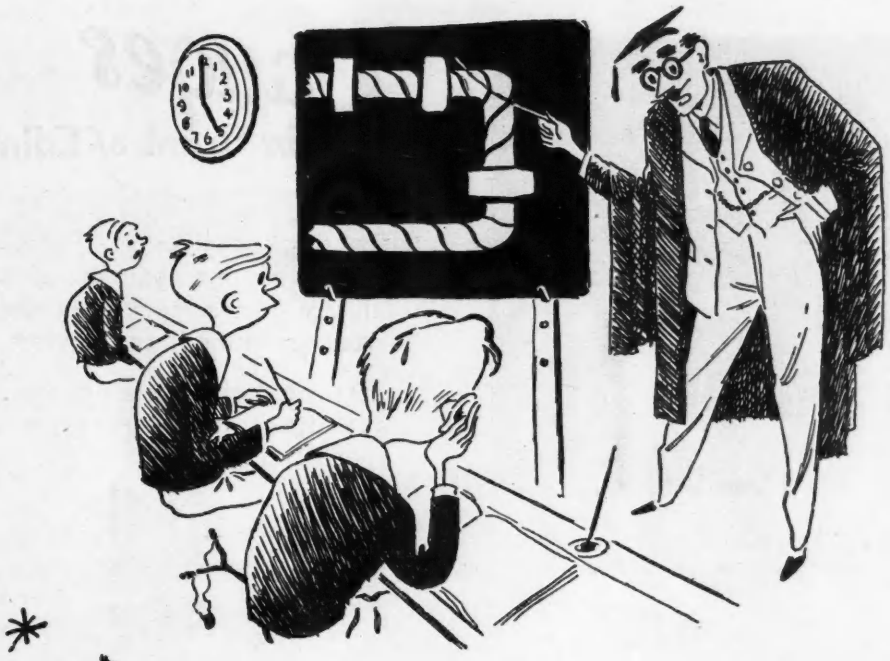

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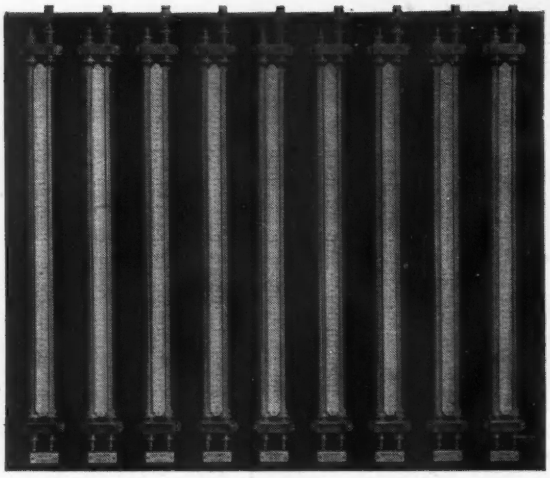

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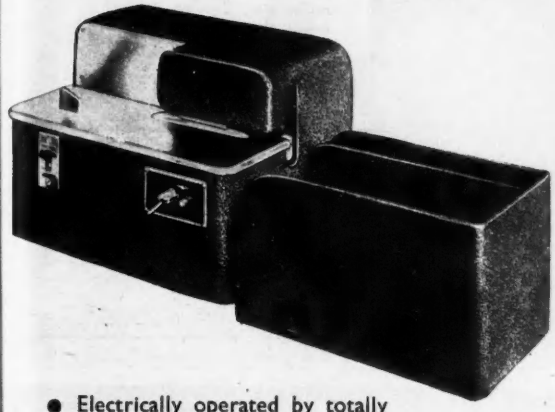

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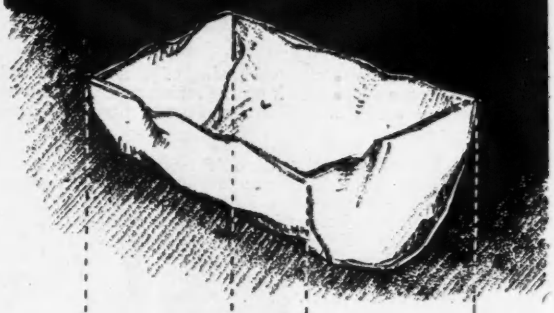

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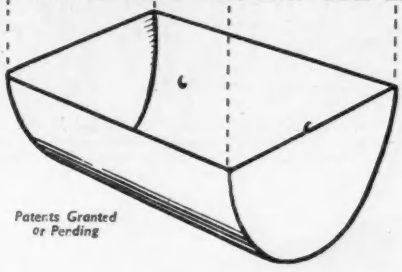

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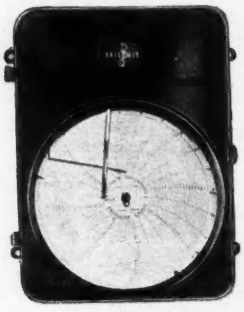

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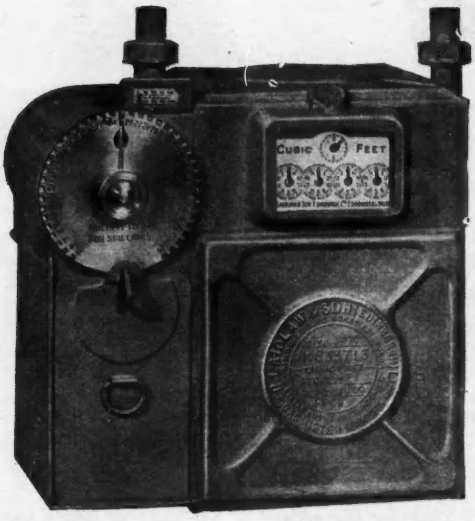

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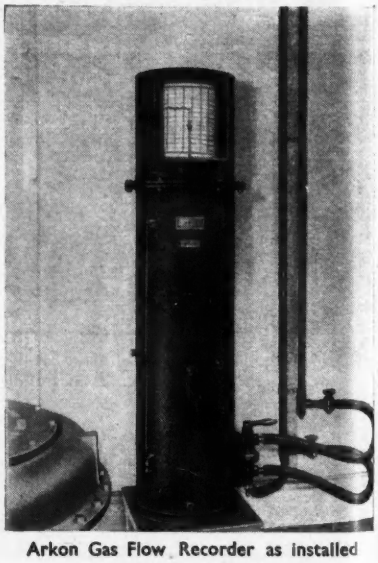

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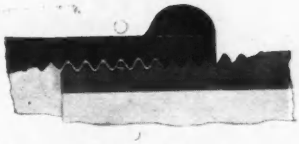

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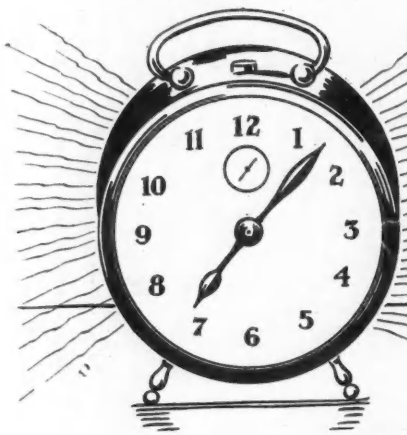

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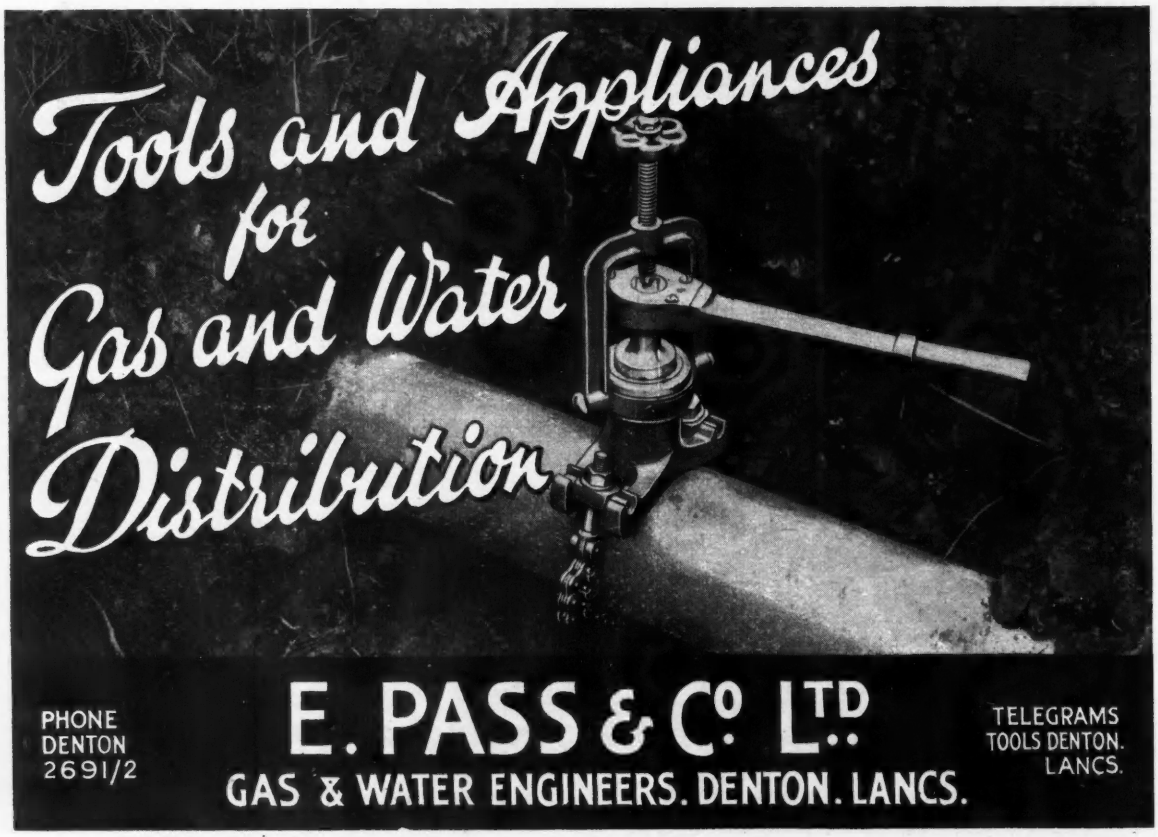

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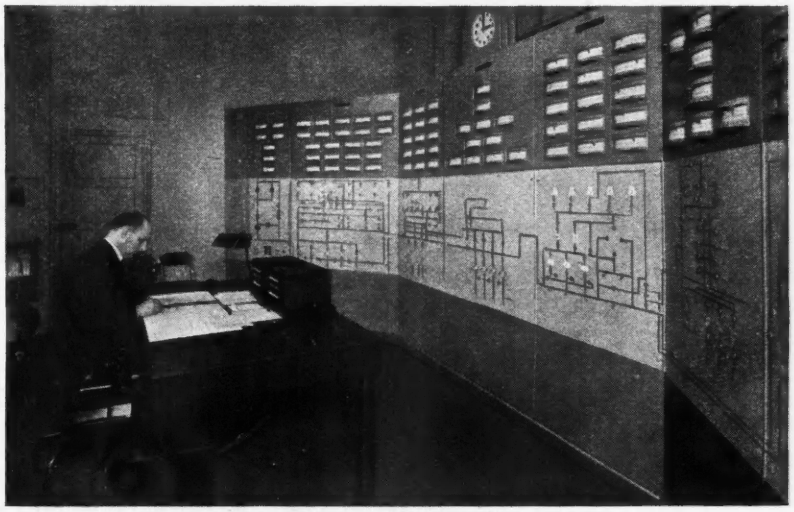
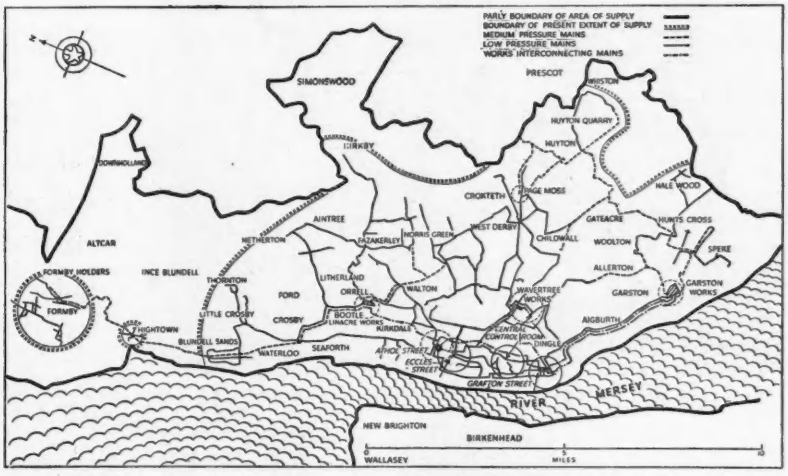


The Control Room of the Liverpool Gas Company



Plan of Liverpool Gas Company's area showing location of the Central Contral Room and three remotely-controlled distribution stations

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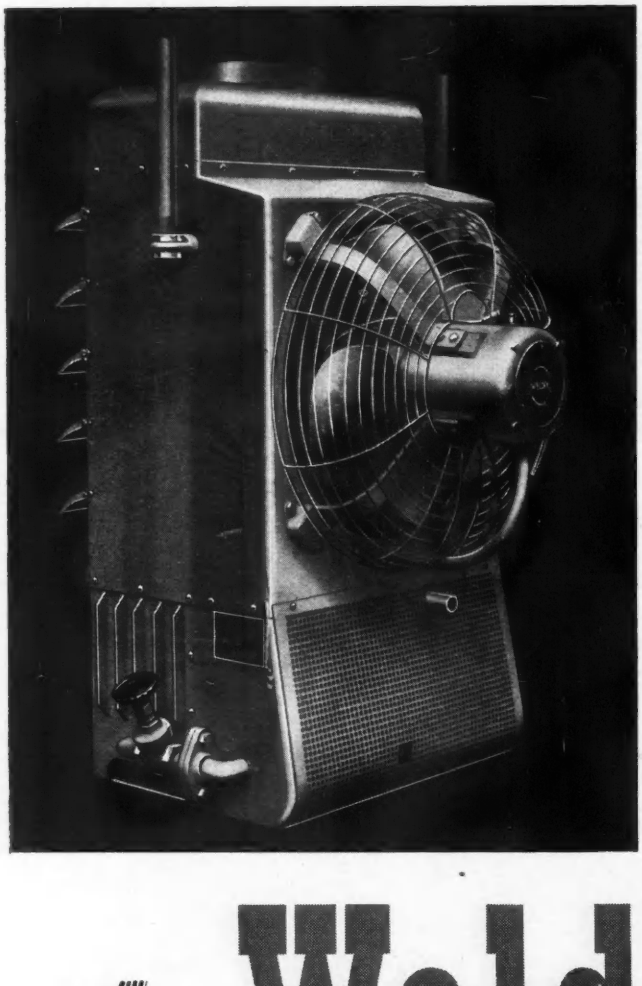

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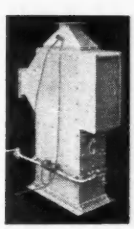

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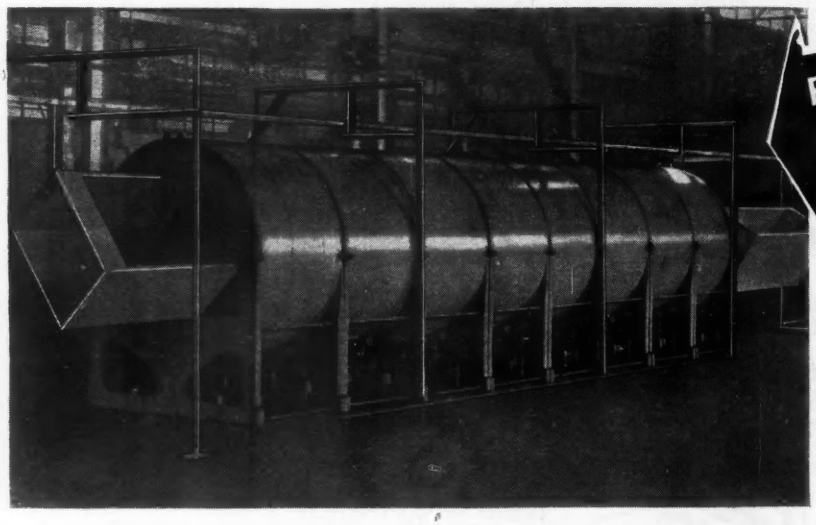

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GAS JOURNAL

Vol. 254 April 14, 1948 No. 4428

THE BUDGET

SIR STAFFORD CRIPPS'S first Budget last week had two main objectives—to secure a real and substantial surplus, and to adjust taxation so as to provide a better incentive to production. Towards the first objective he introduced a special "once for all" levy based on the investment income of individuals for 1947-48, investment covering all rents, dividends, interests, and similar payments, and raised the indirect taxation on beer, wines, spirits, tobacco and certain betting transactions. Towards the second objective he revised the structure of income tax and re-shuffled the groups of goods subject to purchase tax. The appeal to companies not to increase their dividends had brought a wide response and Sir Stafford proposed to leave the matter there until next year, by which time it would be seen whether the promises not to increase the distribution of profits had been carried out. The appeal for the stabilization of prices had also had a marked response, and he did not propose any special legislation regarding personal incomes, prices or profits other than the usual taxation provisions.

When the Chancellor spoke of easing the burdens of the hard pressed housewife and simplifying the structure of purchase tax he aroused some hope of a reduction in the tax on gas appliances, but the sum total of his changes in that regard was that space and water heaters were raised from the 75% to the 100% class, while the tax on domestic and office lighting fittings was decreased from 50% to 33⅓%. Refrigerators, hitherto exempt from the tax, now come into the 33⅓% group. Purchase tax, as it stood on the eve of the Budget, was levied last year largely in the light of the fuel crisis, with the object of bringing about coal conservation, and the then Chancellor of the Exchequer, Mr. Hugh Dalton, promised that the tax on water heaters would again be considered in the light of circumstances ruling when the tax was reviewed. Even if fuel is not yet plentiful the immediate circumstances that were claimed to justify the imposition of the tax have long since disappeared. Its continuance and, indeed, its substantial increase, is profoundly disappointing to the gas industry and is in keeping neither with Sir Stafford's professed desire to help the poor housewife nor with the encouragement of the production effort.

The economics of domestic gas utilization have been proved and we had imagined that public opinion was fully convinced of the idea that gas appliances were necessities—just as much as cups and saucers, saucepans, buckets, brooms, brushes, soap, and cleaning materials are—and wash boilers, which admittedly remain outside the scope of the tax. But now the Chancellor, in abolishing the old 125% group and bringing everything in that group down to 100%, pushes gas appliances, which by all his other reasoning should be exempt, up from 75% into the pure luxury group. Appliance manufacturers found it hard enough to do business on the 75% level; their lot will be much harder now.

The other aspect of the Budget likely to affect at any rate one section of the gas industry is the investment levy, which, whether on grounds of expediency, justice, or logic, has been described as a thoroughly pernicious impost, falling, not on the man who spends his money on jewels, furs, or racehorses but on those who have followed the advice of successive Chancellors and kept their capital in investments. The only thing that can be said in its favour is that it is a "once for all" levy.

UNDERGROUND GASIFICATION

AFTER a long interval, the Gas Research Board has issued Information Circular No. 2, GRB22, presenting a complete picture of the whole of the information available in this country about the subject, fascinating enough in its way, of the underground gasification of goal. Compiled by Drs. N. Booth and L. J. Jolley on the basis of information collected at the Fuel Research Station, it opens with a brief review by Dr. Booth of the possibilities of these methods in Britain. Essentially the process is one of using the seam and the rocks enclosing it as a producer and, as in any producer using coal, there is occasionally the formation of some hydrocarbons arising from distillation of coal in the zones adjacent to the fuel bed proper. The calorific value of the gas extracted is of the order of 100 B.Th.U/cu.ft. when air is used, rising to 150 when this is enriched with oxygen. The thermal efficiency, or coal efficiency, is of a low order. Published data on this point are obviously not very plentiful; in any case they could not be very accurate, but this efficiency appears to be of the order of 20%, rising to 40% when oxygen is used.

A method so crude and wasteful could only be justified in very exceptional circumstances. Dr. Booth suggests that it might be applied in this country to thin, steeply sloping seams, in other words to cases where mining would be expensive in any case, and then only when a low-grade gas could be usefully employed near the pithead. The possibility of saving underground labour is of course very alluring. In one example it is stated that while 2,650 workers are required to mine one million tons of coal per annum, "only 650 workers are required to bring it to the surface in the form of gas." But if only a quarter of it is brought to the surface in the form of gas the difference is not so striking. And the difficulty of transposing values from one currency to another, and from one economic system to another, leads one to doubt whether the cost of underground gasification, in this country, would be considerably lower than that of raising coal by normal methods and then gasifying it—except, that is, in circumstances where the coal was of so poor a quality and in such thin seams as to make it doubtful whether it could be economically raised at all.

The survey of the literature, which occupies most of the Circular, will be most useful. Underground gasification has

nowhere been practised outside Russia. And there, generally with coals of very poor quality, in thin seams, with steep angle of dip, or with a marked danger of spontaneous combustion. The several methods are well described and illustrated. The technical problems arising are generally adequately discussed, though in some instances the gas engineer, to whom this Circular is addressed, will be hard put to follow in detail some of the methods referred to. Boring methods are obviously important but the names quoted of apparatus used will convey nothing to the non-specialist. And is there not an English reference to the Kapitza expansion turbine suggested for the cheap production of oxygen? Oxygen enrichment, by the way, seems to have been used to the extent of 30% and is said to increase threefold the cost of the gas extracted, while it does not appear to have more than doubled the thermal output. The final section on labour and costs leaves one very sceptical. The resultant impression of the whole study is that this method could never have been driven to its present point by the forces of free commercial speculation and would probably not have been supported by the interplay of free technical discussion.

FIELD'S ANALYSIS

THE latest edition of *Field's Analysis* covers the working results of company undertakings for the year ended Dec. 31, 1946, and those for local authority undertakings for the year ended Mar. 31. It is interesting to recall that this is the seventy-third year of publication. The first edition of this work was published in 1869 and except for a short break of five years during 1940/1944 the *Analysis* has been published annually ever since. The high standard we have come to expect is fully maintained in the present issue.

In the 1945 edition the compilers broke away from the traditional design of the *Analysis* and the 1946 figures are compiled also in the new form. Special interest attaches to the work at the present time in that it embodies the standards achieved despite all the handicaps of the present time by the gas industry in its present form as exemplified by the results of a wide variety of undertakings comprising a fair cross-section of the industry. It is surely by these standards at least that the future progress of the industry in its new form under nationalization will be compared. In particular we recommend the work to all local authorities to whom the public are perhaps likely to continue to look in the first place to champion their interests under the new order of things.

Within the scope of this short review we do not propose to engage on an exhaustive analysis of the working results contained in the work, but the reader may be assured that many interesting lines of thought are brought to notice by the form in which the *Analysis* is framed.

When we turn to the pages showing the average prices for gas charged to consumers under the heading of "Sale of Gas", we are struck by the fact that there are still some cases which stand out prominently to advantage, due no doubt to some particularly favourable causes of a local character. It is interesting to speculate how far such local advantages will be retained under the merging involved by nationalization or how far they will be dissipated over the far wider range of a nationalized area.

Great credit is due to the compilers and the staff engaged on the *Analysis* for the able manner in which they have attempted to achieve a degree of uniformity of analysis from wide differences in accounting and statistical practice which still prevail in the industry.

The *Analysis* is now on sale and can be obtained from the publishers, Messrs. Eden Fisher & Co., Ltd., 6/8, Clements Lane, London, E.C.4. at the pre-war price of £2 2s.

Personal

Mr. GEORGE ROYDEN, Works Superintendent at the Inchgreen Works of the Greenock Corporation Gas Department since 1945, has been appointed Station Manager at the Tradeston Works of the Glasgow Corporation Gas Department, and will take up his new duties next month.

* * *

Owing to ill-health, Mr. GUSTAV FALK has resigned his Chairmanship and Joint Managing Directorship of Falk, Stadelmann & Co., Ltd., but he will retain his seat on the Board. The Directors have appointed Mr. HUGO FALK to be Chairman of the Company in addition to his office as Managing Director, and they have also appointed Mr. R. STEWART, C.A., Vice-Chairman. Mr. W. E. JEWELL, who has served the Company for 52 years and has been head of the Contracts Department, has also resigned.

* * *

Plymouth and Stonehouse Gas Light and Coke Company employees paid tribute on April 1 to Mr. GEORGE H. BOLTON, who has retired from the position of Secretary and Head Office Manager after 48 years' service, but will remain a Director. Colonel R. L. Norrington (Chairman and Managing Director) presented Mr. Bolton with a gold wrist watch and a leather toilet case on behalf of the staff. Appreciative speeches were made by Mr. R. J. H. Clark (Engineer), on behalf of the Works and Distribution Department, and Mr. W. H. Batho (Chief Clerk) for the head office. Earlier, following Mr. Bolton's last attendance at a Board meeting as Secretary, the Directors and principal officials had been invited to a luncheon by Colonel Norrington, who presented Mr. Bolton with two cases of pipes from his fellow-Directors. Mr. Bolton joined the Company in January, 1900. He was appointed Secretary in 1917 and a Director in 1935. The Assistant Secretary (Mr. HUBERT J. BOARD) has been appointed to succeed Mr. Bolton as Secretary and Head Office Manager.

Obituary

The death has occurred of Mr. JAMES H. WOODWARD, of Haworth, at the age of 86. Mr. Woodward was appointed Manager of the Skipton Gas-Works in May, 1898, when the works were still under the control of the Skipton Gas Light and Coke Company. Two years later the undertaking was acquired by Skipton Council, and Mr. Woodward remained Manager until his retirement in March, 1928.

* * *

The death is reported of Mr. THOMAS H. RICH, who retired shortly before the war after more than 30 years' service as General Manager of the Millom Rural District Council Gas Department. He was a member of the Manchester District Association of Gas Engineers and of the Cumberland and Westmorland Gas Managers' Association. His eldest son, Mr. J. H. Rich, is Distribution Superintendent of the Wellingborough Gas Company, and was formerly with the Wolverhampton Gas Company.

GAS SUPPLY AT SWADLINCOTE

The Ministry of Fuel and Power has reaffirmed its decision to authorize the Swadlincote Gas Department to take a supply of gas in bulk from the Derby Gas Light and Coke Company. As reported in the "JOURNAL" of Feb. 18, a meeting of representatives of the Swadlincote Urban District Council, the Derby Gas Light and Coke Company, and the Burton Corporation was held in January to discuss the gas supply position, and the Ministry's reaffirmation of its previous decision follows consideration of the facts disclosed at that meeting, particularly the information given by Swadlincote's representatives that new demands in the area would increase, owing to industrial requirements and the erection of new houses, to an extent beyond the capacity of the existing gas-works.

A further letter from the Ministry has intimated that the Derby Gas Light and Coke Company has been informed that the Company and the Swadlincote Council were authorized under Regulation 56A of the Defence (General) Regulations, 1939, to execute the laying of a new main from Derby to Swadlincote to provide a bulk supply, at an estimated cost of £53,100. Authorization for the purchase of the necessary materials would be issued by the Ministry at an early date, and the Company had been authorized to proceed to obtain a Special Order to enable them to lay the main through the area of supply of the Burton-on-Trent Corporation.

The question of loan sanction in respect of the project is being taken up with the Ministry of Fuel and Power.

The Glasgow and West of Scotland Blood Transfusion Service recently appealed for donors, and over 10% of the staff and personnel of the Falkirk Works of R. & A. Main, Ltd., volunteered and made their contribution to the mobile blood transfusion unit when it visited the district.

News in Brief

The Price of Domestic Gas at Nottingham is to be increased by 1d. a therm from this month. The increase will mean the price per 1,000 cu.ft., at present 2s. 11d., will be 3s. 5d.

Cadbury's Demonstration Centre, Oxford Street, London, W.1, has become very popular with shopping crowds. Here one is able to rest and also one can get refreshments and information and enjoy a demonstration. The gas appliances include a New World cooker, Ascot boiling water heaters, and Friedman-Athill boiling rings, which are seen daily by hundreds of shoppers.

The Export Promotion Department of the Board of Trade (with the exception of the Exhibitions Branch) has moved from 35, Old Queen Street, S.W.1, to Thames House North, Millbank, London, S.W.1. The telephone number (Victoria 9040) remains unchanged. The Exhibitions Branch, which among other work deals with the British Industries Fair, will, for the time being, remain at the old address with, however, the new telephone number of Abbey 9040.

The Low Temperature Coal Distillers Association of Great Britain, Ltd., which has just held its annual general meeting, has been presided over by Colonel W. A. Bristow since its inception in 1930. In the 15 years of the Association's existence the manufacture of smokeless fuel in this country has advanced practically from zero to an important place in the nation's economy. Colonel Moore-Brabazon, now Lord Brabazon, was the Association's original Vice-President.

New Coke Ovens being built at Randolph Colliery, Evenwood, Co. Durham, are expected to be producing coke by June. The battery comprises 15 modern Becker under-jet coke ovens and each oven has a capacity of 14¼ tons and a carbonizing period of 17 to 18 hours. The present battery of 58 ovens has been in use since 1910. The new plant has been built for Sadler & Co. by the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd.

Imperial Works of D. G. Hall & Co., Ltd., Coverack Road, Newport (Mon.), has been purchased as a going concern by Thos. W. Ward, Ltd., Albion Works, Sheffield. The works on the bank of the River Usk occupy a site of approximately four acres and have been operated for some years on the building and repair of railway wagons. Facilities include log mill, steel wagon repair shop, press shop, fitting shop, wagon shop, wheel shop, &c. It is intended to develop to the full the scope of the various workshops. Wagon repairing will be given first priority in view of its urgent necessity for the efficient operation of British Railways, and repairs to railway wagons of all types, both steel and wood, will be undertaken. The Company will, on the final take-over date, offer re-employment to all workmen.

Nearly One-third of the 200 members in the Liverpool General Branch of the Association of Scientific Workers parted company with the parent body when the first Gas Branch of the Association held its inaugural meeting in Liverpool. Mr. F. A. Crone, the North-Western Regional Organizer, was in attendance. Major I. Waide, Secretary of the Liverpool General Branch, presided until the officers of the new Merseyside and District Gas Industries Branch were elected. These were Mr. J. Gaskarth, B.Sc., Assoc.M.Inst.Gas E., as Chairman, Mr. H. B. Gidlow as Secretary, and Mr. R. Jones as Treasurer. The new branch, which will cater for all scientific and technical staffs of gas undertakings in the Merseyside and Deeside areas, already includes over 80% of the technical staff of the Liverpool Gas Company as members.

The Housing Centre is holding on April 23 a One-day Conference to discuss problems of local authority housing at the present time. The morning session will be devoted to a discussion of the parts which should be played by central and local government and by the responsible representatives and technicians in housing work. This session will be of particular value to new members of Housing Committees and prospective candidates as well as to technicians working for the authorities, and will raise some points of particular importance in view of the great increase in the proportion of housing carried out by the local authorities. In the afternoon session an opportunity will be given to those concerned with the administration of housing to hear an informative talk from an official of the Ministry of Health and to raise their detailed administrative problems.

In Co-operation with local school authorities, John Wright & Co., Ltd. (Radiation, Ltd.), have recently arranged tours of their works by parties of "extra year" pupils from elementary schools. The primary object of the visits is to give boys and girls who will soon be leaving school some idea of the variety of jobs open to them. By this means, it is hoped to encourage young folk to give some consideration to the type of employment for which they are most suited by capabilities and inclination, thus reducing the amount of job-changing which results from the hit-and-miss methods of finding the right job for the right person. The parties were taken round various office and production departments by guides who briefly explained the work of each section. Questions were encouraged and, by limiting the size of each group, it was possible to give individual attention to any boy or girl who showed special interest in any particular job.

The Annual General Meeting of the North of England Gas Managers' Association will be held at the County Hotel, Newcastle, on May 7, at 2.15 p.m., when an address will be given by Mr. R. D. Keillor entitled "Gas Industry Administration and Nationalization."

Three B.G.C. Mobile Film Projection Units achieved during the first week in March an all time record of 59 shows in five days to a total audience of 9,818, in the North-Eastern and Midland Districts, where they continued to operate until the end of March. During April, projection units are operating in London and South-Western Districts. A preview of the films shown under this scheme—and held at Gas Industry House—was well attended by teachers and representatives of many important organizations, and resulted in heavy bookings for shows of gas industry films.

Skegness U.D.C. has been recommended by its Gas Committee to ask the British Gas Council to make representations against the totally inadequate sum proposed as compensation on nationalization. It is asked that attention should be drawn to the large capital expenditure by the Council out of revenue and to the fact that ratepayers had contributed more than £15,000 to the undertaking by way of grant aid. The Committee has recommended that application should be made to the Ministry of Fuel and Power for consent to a reduction of 3d. per 1,000 cu.ft. for gas supplied to consumers on the block scale.

A Successful Preview of the programme of gas industry films to be shown under the B.G.C. Mobile Film Projection Scheme, 1948-49, when it operates in the South Wales District in May next, was held at Cardiff on Mar. 18. There was an excellent attendance of members, representatives of the teaching profession, and other interested parties, and an enthusiastic reception was given to the films. Special tribute was paid by science teachers present to the gas industry films on the transference of heat, which productions were specially made for classroom use. Resulting from this preview there have been numerous bookings for film shows.

Four More Grey Books (discussion editions) have just been issued from Gas Industry House, three of them from the Institution of Gas Engineers, and the fourth from the Gas Research Board. They are Communication No. 315/136 ("The Control of Chemical Reactions on a Large Scale," by Dr. J. G. King); 317/138 ("The Education, Recruitment, and Training of Gas Engineers," by Professor Stacey G. Ward); 327/145 ("Factors in the Design of Pin-Hole Gas Burners," by R. Jessel and H. R. Hindley); and GRB 30/16 (8th Annual Report of the Council of the Gas Research Board). The price of each publication is 2s. 6d., post free.

A Non-Profit Making Exhibition, run in conjunction with Government Departments, is to be held at Poole, Dorset. The Mayor is Chairman of the organizing committee of local trade union men and industrialists. Called "Poole Industrial Products Exhibition," it will be held in Poole Park from June 19 to June 25. Some shipyards may have some open-air exhibits in the park, but the majority will be in marquees. Exhibitors are limited to local manufacturers. Poole Park lake will be used by engineering undertakings making pumps, and so on. The East Dorset district is famous for its ball clay, and several of the potteries will be exhibiting. It is expected that the opening will be performed by a Cabinet Minister.

Very Successful performances of B.G.C. films were given to selected audiences in Durham City during the month of March, 856 people attending the 10 performances. Particularly important and useful to the industry was a display of films and a short address entitled "Gas on the Farm" given by Mr. A. S. Middleton, Secretary of the City of Durham Gas Company, to a group of agriculture students at the Durham County Council School of Agriculture, Houghall. Keen interest in the possibilities of gas in agriculture was shown by the students at question time. Possibly the most important of the audiences was one comprised of 130 domestic science teachers from all parts of Durham County. The subject matter of the films was highly praised by Miss L. C. Anderson, Supervisor of Domestic Subjects to the Durham County Education Committee.

Competition for the Award in 1948 of the Bronze Medal endowed by Sir William J. Larke, K.B.E., a Past President of the Institute, is invited by the Institute of Welding. The Council have decided in the competition for the current year to award a first prize of £50 to the winner of the medal and other prizes to a total value of £50 to be allocated at the discretion of the examiners. The competition is open to Members, Associate Members, Companion Members, Graduates, Associates, and Student Members of the Institute of Welding. Candidates have to submit an original unpublished paper on one or more of the following subjects: Gas welding, arc welding or resistance welding, dealing with practical applications embodying specific details of welded work; welding technique, gas or arc welding; and design of welding equipment, gas, arc or resistance welding. No paper will be considered which contains any advertising matter or commercial propaganda, and entries for the competition should reach the Secretary, the Institute of Welding, 2, Buckingham Palace Gardens, London, S.W.1, by Oct. 1, 1948.

NEWS IN BRIEF—(Continued).

So Much Damage has been done to the street lamps at **Brigg, Lincs,** by hooligans pelting them with stones, that the Gas Committee has approved the purchase of thicker glass for the lamps. Damage has been done to the lamps over a considerable period and it is hoped that the thicker glass will have the desired effect.

A Successful Series of Cookery Demonstrations was recently given in the Demonstration Theatre of the Cheltenham and District Gas Company. The average attendance at each demonstration was no less than 100 persons. The programme included selections by the Company's Home Service Adviser and Cookery Demonstrator.

Edinburgh Gas Department Golf Club held their Jubilee Luncheon in the Kintore Rooms, Edinburgh, recently, when workers and officials and their friends gathered to mark the Jubilee and to present Club prizes. The highlight of the evening was the presentation to Mr. A. Sandie, of the Challenge Cup by Mrs. Melvin, wife of Mr. D. D. Melvin, Engineer and Manager.

The Trade Statistics for February, 1948, just issued by the Department of Industry and Commerce in Eire, show imports of 35,059 tons of gas coal, valued at £157,257, as against 6,469 tons, valued at £19,821 in February, 1947. This brings the total of these imports for the first two months of 1948 to 49,220 tons, valued at £211,392, compared with 24,718 tons, valued at £75,288, in the corresponding period of 1947.

Bradford City Council refused in January on the suggestion of the Estimates Sub-Committee to allow the Gas Committee to repair railway crossings at the Canal Road entrance of Valley Road Gas-works at a cost of £1,277. Now the Street Drainage and Works Committee has recommended the removal of the crossings, and the repair of the road surface at a cost of £500, subject to the cost being defrayed by the Gas Committee. This recommendation the Estimates Sub-Committee has endorsed, and, at the same time, has disapproved the Gas Committee's refusal to pay the £500. If this disapproval is upheld the Gas Committee will be compelled to foot the bill.

The Chief Constable of Sheffield, Mr. G. E. Scott, accompanied by Inspector S. W. Morris, of the Accident Prevention Department, visited the Neepsend Works of the Sheffield and District Gas Company on Mar. 19 to present Safe Driving Awards to 46 drivers of the Traffic Department. In the unavoidable absence of the General Manager, Mr. Ralph Halkett, the Chief Constable was received at the works by Mr. W. Woodcock, A.Inst.T., Transport and Mechanical Superintendent, and Mr. William R. Oliver, Public Relations Officer. Alderman C. W. Gascoigne, ex-Lord Mayor of Sheffield and a member of the Gas Company staff, proposed a vote of thanks, seconded by Major G. E. Stone, the Company's Safety and Welfare Officer.

Figures Displayed in Shipley gas showrooms in connexion with the fuel economy campaign give some interesting information taking into consideration the crippling burden of loan charges under which the Shipley gas undertaking has struggled for so long. While coal carbonized has increased from 11,488 tons in 1940 to 18,361 tons in 1947, the price of gas per 1,000 cu.ft. has remained static at 5s. 10d. This is no mean achievement in face of the prodigious rise in coal from 24s. 4d. a ton in 1939 to the present day 56s. 3d. It denotes the increased efficiency of Shipley's gas undertaking since paying off the loan charges in 1943, and its gas charges now compare favourably with those of many other districts. Incidentally, the total gas consumption has risen from 208,000,000 cu.ft. eight years ago to 310,000,000 cu.ft. to-day.

Diary

April 16.—**Royal Institution**: "The Gas Industry," Dr. E. V. Evans, 9 p.m.

April 16.—**Institution of Chemical Engineers**: Annual Meeting, Connaught Rooms, 11.45 a.m. Luncheon 1 p.m.

April 16.—**London and Southern Junior Gas Association**: "Laying a Gas Main in the Sea," J. A. Williams, Gas Light and Coke Company. Gas Industry House, 7 p.m.

April 16.—**Scottish Junior Gas Association (Western District)**: Annual General Meeting.

April 20.—**Wales and Monmouthshire Junior Gas Association**: Annual Meeting. "Some Aspects of Works Production and Maintenance," A. G. Saunders, Chief Technical Assistant Swansea Gas Light Company. Talbot Room, Mackworth Hotel, Swansea, 2.30 p.m.

April 20.—**Gas Research Board**: Annual Meeting, Institution of Mechanical Engineers.

April 21.—**Eastern District Gas Salesmen's Circle** (Eastern District): Visit to Works of R. & A. Main, Ltd., and Thomas Glover & Co., Ltd., Edmonton, 10.30 a.m.

April 21.—**Manchester District Junior Association of Gas Engineers,** and **North Western District Gas Salesmen's Circle**: Joint Meeting. "Fuel Problems in Post-War Dwellings," H. P. Lupton, A.I.C., M.Inst.Gas E., Vocational Training Officer, Liverpool Gas Company: Radiant House, Bold Street, Liverpool, 6 p.m., preceded by high tea, 5 p.m.

April 21.—**Institute of Fuel (London Section)**: "Recent Developments in Combustion," D. T. A. Townend, D.Sc., Ph.D., D.I.C. Institution of Mechanical Engineers, Storey's Gate, S.W.1, 2.30 p.m.

April 22.—**Institute of Fuel**: Annual Corporate Meeting, Connaught Rooms, London, 11 a.m.

April 27.—**Midland Junior Gas Association**: Annual General Meeting. Film Evening.

April 27.—**Southern Association of Gas Engineers and Managers (Eastern District)**: "Sales and Service Organization for the Smaller Gas Undertaking," Lieut.-Colonel P. G. Wright. Gas Industry House, 2.30 p.m.

April 29.—**Yorkshire Junior Gas Association**: President's Day. Sheffield, 10 a.m.

April 30.—**Manchester District Association of Gas Engineers**: Annual Luncheon and Meeting, Grand Hotel, Manchester.

May 5.—**Junior Institution of Engineers (Midland Section)**: "The Development of Domestic Gas Appliances," Colonel H. S. Walter. James Watt Institute, York House, Great Charles Street, Birmingham, 6.30 p.m.

May. 7—**North of England Gas Managers' Association**: Annual Meeting, County Hotel, Newcastle, 2.15 p.m. Address by R. D. Keillor.

May 12.—**Domestic Development Committee**: Technical Sub-Committee, Gas Industry House, 10.30 a.m.

May 12.—**Domestic Development Committee**: Gas Industry House, 2.30 p.m.

May 14.—**Junior Institution of Engineers**: Fifth Stevens Memorial Lecture, "Coal, Oil, Chemicals," Dr. J. G. King. Royal Society of Arts, Adelphi, 6.30 p.m.

GLASGOW EXHIBITION

The Glasgow Corporation Gas Department had an imposing stand at the Scientific Engineering and Fuel Efficiency Exhibition at Glasgow.

Smaller industrial equipment was especially featured, and the appliances included an air heater, steam boiler, C.C. brazing unit, infra-red tunnel, infra-red panel, muffle furnace, central heating boiler, Duoflam burner, large range baking oven, and water heaters.

Most of the appliances could be demonstrated, having the required services connected. Throughout the period of the exhibition demonstrations of baking by a Glasgow baker, infra-red drying, brazing, air heating, and the various uses of steam were demonstrated by the Gas Department's staff.

Richard Crittall & Co., Ltd., of London and Hillington, Glasgow, had a variety of displays, among which was one outlining the firm's activities in the gas fuel industry as applied to buildings and factories. Fibreglass, Ltd., of Glasgow, had a show of their glass fibre in the various forms utilized for thermal insulation.

A feature of the exhibition was a one-day conference of women's organizations, with short lectures during the morning and a brains trust in the afternoon.

SPOTLIGHT ON THE HOME

A very successful series of films, lectures, and demonstrations under the title of "Spotlight on the Home" has just been concluded by the Stretford and District Gas Board at the Urmston showrooms. There was an average attendance of 112 at a series of ten functions. Apart from an initial attendance of 184 for the opening discourse on "Colour in the Home" the largest attendance was recorded on the evening when "Beauty Culture and Hairdressing" was the subject.

Consumers were very pleased with the course and readily expressed their appreciation of the opportunity of widening their knowledge on such a wide variety of subjects related to the housewife in the execution of her daily duties. The Gas Board also enjoyed considerable local Press publicity as a result of the course, which provided an excellent opportunity for special window displays.

LIQUID FUELS CONFERENCE

The Institution of Petroleum and the Institute of Fuel are to hold a joint conference on "Modern Applications of Liquid Fuels" at Birmingham University on Sept. 21-23, together with an exhibition of items related to the subjects on the programme.

The general scope of the conference will be indicated in an opening address on "The Place of Liquid Fuel in the British Economy." Separate sessions, each of 2½ hours, will then be devoted to: Diesel engines for power generation and railway traction; oil for gasmaking; gas turbines for land and marine power purposes; agricultural drying processes; fuel oil in the steel industry; fuel oil in the metal industries; and fuel oil in the glass and ceramic industries; while there will also be an evening lecture on "Domestic Heating."

The 15 authoritative papers, to be presented at the conference in summary form, will be printed in full and issued, bound in one volume, one month before the conference. Full details will shortly be circulated to members of both Institutes, while enquiries, which will be welcomed from others interested, should be addressed to the Secretary, The Institute of Fuel, 18, Devonshire Street, W.1.

BIRMINGHAM EXTENSIONS

The West Bromwich Town Council has received with disappointment the decision of the Minister of Town and Country Planning to approve the proposals of the Birmingham City Council for the extension of the Swan Village Gas-Works. In a letter submitted to the West Bromwich Council on April 7 the Minister pointed out that while he recognized that the existing gas-works caused grave offence over a quarter of a mile radius he felt obliged to approve the extension proposals because of the national need for a rapid increase in gas output. The choice of an alternative site offered by West Bromwich at its own gas-works, while preferable from a planning point of view, would cause two years' delay in the provision of additional supplies of gas and grave prejudice to national interests.

Councillor A. Medley, referring to negotiations following his protest last July, said representatives from the city undertaking went to West Bromwich "superior, arrogant and important, armed with a variety of arguments ostensibly designed to impress what they regarded as a third-rate town. They put their case first, and I quickly sensed the ruthlessness of people in such high places wielding the power they possessed over part of West Bromwich."

He described the Council's deputation to the Ministry in London as "a sorry and miserable affair from beginning to end," and criticized Council Brown, Chairman of the Birmingham Gas Committee, for boasting that his undertaking had delegated powers and were not answerable to the Council for what they were doing in West Bromwich.

Recalling that people in the Swan Village area asked West Bromwich Gas Department to investigate complaints of gas percolating into houses, Councillor Medley said: "It was found that pouring into West Bromwich sewers was a liquid which, according to one of our officials, was so deadly that it would kill every living organism in touch. This liquid was percolating into the drains of houses, vapourizing, and making the atmosphere so poisonous as to render the houses untenable."

He claimed that Mr. Silkin's report confirmed everything of which West Bromwich had complained. "As members of the Council we seem doomed to frustration, and after the spirit with which we began our opposition to this move this is a miserable way in which to end our efforts," he added.

The Mayor (Alderman G. C. W. Jones) said the Minister had given assurances with regard to the gas-works extensions, and the Council would take every step to ensure that they were observed.

The Council decided to write to the Town Clerk of Birmingham, pointing out that in the erection of the new works it will expect every practicable step to be taken to minimize nuisance from dust, smell and grit, and urging that as the existing works are an admitted nuisance, steps shall also be taken to effect such remedies as are practicable in the circumstances.

LIVERPOOL EXPORTS COKE AGAIN

Liverpool has begun exporting coke again. The first shipments to leave the Mersey since before the war began loading last week in the Swedish steamer Margol for Stockholm. Considerable engineering arrangements had been made to facilitate this and other shipments now ordered, by the building of a special ramp at the Garston Works of the Liverpool Gas Company, and the installation of new screening plant, all within a matter of a few weeks.

There were 1,500 tons of graded coke waiting at Garston Dock to go into the steamer, which has been specially built up to take a large cargo on her decks. The coke was brought in 270 railway wagons from the gas-works at Linacre, Athol Street, and Garston. Men worked in shifts "round the clock" to complete the operation in four days. The cargo is the forerunner of a series of shipments to both Sweden and Finland and will probably mark the re-opening of a steady coke traffic from Liverpool to those countries.

Bidding the ship *bon voyage* at Garston Docks were the Swedish Consul (Mr. Edward Behrend), the General Manager of the Liverpool Gas Company (Mr. C. H. Leach), the Engineer of the Gas Company (Mr. W. S. Hubbard), and representatives of the shipping agents, A. Coker and Company. They met the Captain of the Margol, Captain Jacok Wiberg, of Harnosand, who brought over a cargo of timber to Bristol before calling at Liverpool for the coke.

GAS SERVICES AND INSTALLATIONS

Before the war, three classes of tubing, known as steam, water, and gas weights were available for general engineering purposes. Broadly speaking, this nomenclature indicated the purposes for which each class of tubing was suitable and, as a means of identification the steam and water weights were painted red and blue respectively, while the gas weight was left uncoloured.

Gas undertakings used steam weight for underground services and exposed positions above ground, and gas weight for internal installation pipes. During the war, in order to economize in steel, only two classes of tubes were manufactured, these being known as heavy and light weight respectively. The heavy weight tubing was of the same thickness as the pre-war water weight, and the light weight a gauge thinner than the pre-war gas weight. The heavy weight was painted red and the light weight left unpainted. No tubing of equivalent thickness to the pre-war steam weight was manufactured during the war period. A new British Standard B.S. 1387 has now been published and tubing and tubulars will in future be manufactured in accordance with this new standard. Three classes of tubing will again be available. The nomenclature adopted for identifying the various classes of tubing does not, as was the case for pre-war tubing, convey even broadly the purposes for which each class is suitable. The tubing will be known as Class C, B, and A.

Class C tubing is identical in gauge for each size with the pre-war steam weight tubing and can therefore be used for all purposes for which steam weight was employed before the war. It was originally intended that Class C tubing should be identified by a strip painted in green running throughout the length of the tubing, but it appears likely that a series of rings painted in green, occurring at intervals along the length of the tubing, will be adopted.

Class B is identical in gauge for each size with the pre-war gas weight, and yellow is the identification colour. Class B tubing is suitable for internal installations. Special attention is drawn to Class A tubing identification colour brown, which is lighter in gauge than the pre-war gas weight. The new Class A tubing is, for the ⅛ in. and ¼ in. sizes, one gauge lighter, and for the larger sizes, two or three gauges lighter than the thinnest tubing used before the war for conveying gas.

With the thin walls of Class A tubing, insufficient metal may be left under the roots of the threads when these are cut under practical fitting conditions. For mechanical reasons Class A tubing is, therefore, considered unsuitable and potentially dangerous if used for the conveyance of gas.

The following schedule is helpful in deciding the class of tubing suitable for the various purposes given, and it is stressed that when ordering, the class of tubing required should be clearly stated in terms of the latest nomenclature in B.S. 1387.

Tubing—(i) For internal gas installations or tubes above ground, Class B. (ii) For gas services underground, for any tubes laid under composition floors, and for tubing protected by wrapping, Class C.

Tubulars—A. Tubulars with parallel threads such as connectors, double connectors, connector bends, running nipples, and return bends. (i) For internal gas installations or tubes above ground, Class C. (ii) For gas services underground, for any tubes laid under composition floors, and for tubing protected by wrapping, Class C. B. Tubulars with taper threads. (i) For internal gas installations or tubes laid above ground, Class B. (ii) For gas services underground, for any tubes laid under composition floors, and for tubing protected by wrapping, Class C.

GAS IN FRANCE

THE Ste. des Ingénieurs Civils de France follow their last year's Report of the Commission on Fuel Economy with a further series of papers on fuel economy in a number of industries, rounded off with conclusions and suggestions for the formulation of general policy by M. Marcel Véron. Glass, ceramics, and cement are the particular industries covered. Chemical industry is covered in three papers under the headings mineral, organic, and synthetic, with one on economies resulting from the use of recuperation in chemical processes involving the use of heat. But the two papers of most interest to us are those on space heating in general by M. Dupuy and individual domestic heating appliances (stoves) by M. Ulmer.

The French point of view on this question is very interesting, for coal and other fuels are largely imported. The problem of space heating is to be considered both as an element in the economy of national resources and as a factor in the equilibrium of exchange. Above all waste must be eliminated. All useless consumption must be cut out, no source of energy must be left unproductive, and all available energy must be given its most fruitful application. But the chief aim being to produce more than is consumed, importation of fuel must not be reduced so far as to impair capacity of production. The importance of economy in space heating is indicated by the fact that one sixth of the total consumption of coal is used for this purpose in the raw state and if to this is added the coal equivalent of gas and electricity the fraction rises to one fifth and perhaps one quarter of the coal used in France, apart from the consumption of wood which is estimated to be equivalent to a further 5 to 10 million tons of coal.

Space Heating

M. Dupuy notes that space heating is peculiar in that it responds to a vital need, it is badly defined quantitatively since its appreciation is partially subjective, and its wide dispersion renders it difficult of access for systematic rationalization. The two last aspects have led to action by way of rationing but this mode of action presents grave dangers to the first named feature and it is difficult to control the efforts of those interested to escape these dangers. Excessive rationing imperils public health and leads to the deterioration of dwellings and their interior equipment. To avert this, some people procure in the black market quantities of coal much in excess of official allocations, others buy in haphazard fashion combustibles not suited to economical use in the apparatus, others strip the woods and forests, particularly in the neighbourhood of towns, with deleterious effects on a national asset, and others, finally, install electric radiators, involving the consumption of still greater quantities of fuel besides adding to the already excessive load on power stations and distribution systems.

Grave public danger would result from a prolongation of the present situation. On the other hand, the causes of the fuel shortage are not temporary. It is no longer a question of wartime restrictions which will pass away. There is a permanent poverty in fuel and energy which it is necessary to reconcile with the necessities of normal life, and what is more, with economic progress. However pressing may be the fuel requirements of industry it is not possible to consider domestic heating as a field which can be denuded without limit. On the other hand, in this field too, the minimum must be sought of expenditure of energy for the same result. The factors governing this quest are considered in detail.

A substantial economy can be effected by closer attention to the interior temperatures to be attained. The "18°C everywhere" of before the war must be reduced. 16° to 18°C is suggested for sitting rooms, 18° for bathrooms, but 10° should suffice for bedrooms during the night though 14° is necessary when dressing or undressing, while temperatures here may be permitted to fall during the day. It is rarely possible to vary temperatures to suit the real requirements according to the time of day but appreciable economies can be effected by steps in that direction. In work-rooms temperatures can be adapted to the nature of the work and in large workshops a general air temperature may be supplemented by zonal heating in localized working places.

Insulation

On the effect of the construction and arrangement of buildings the importance of the insulating properties of walls is emphasized. It is desirable that in small houses the arrangement should be as compact as possible. The suppression of chimneys is deprecated. Every room in which local or seasonal heating is necessary should be provided with an outlet permitting the use of combustion appliances, including gas. Background heating by heated air is advocated and the tendency to suppress basements in individual houses is also deprecated because it prevents the installation of boilers or air-heaters in their natural position.

The design of heating apparatus should permit the convenient regulation of temperature, by simple means, according to variations in outside temperature and to the requirements, according to use and time of day, of different rooms. Three types are mentioned; base temperature constant or slightly variable plus localized and variable point heating: general heating in cold weather at different temperatures in different apartments plus warm weather heating limited to certain rooms and variables: localized heating with each room independently heated and controlled. It is hoped that the forthcoming conference on space heating will arrive at conclusions capable of guiding architects in the selection of the best type of heating to suit each case. It is necessary to guard against rash judgments favouring one or other of these types without experimental proof.

Heat Sources

Sources of heat are divided between fuels proper and electricity. Home produced coal, coke and wood are to be preferred but residues, such as those from the refinement of petroleum, may also be economically used. Town refuse destructors may serve for district heating. The advantages of liquid and gaseous fuels, permitting instantaneous starting and stopping and convenient automatic regulation, are emphasized. It is considered that an efficiency of 60% should be attained by all acceptable methods of space heating. The use of electricity is generally deprecated because it involves the consumption at the power stations of 2.5 to 3.5 times as much fuel as would be consumed in localized combustion apparatus. A possible exception is the case where the electrically driven heat pump may be used for heating closely contiguous blocks of buildings. At the moment, due to the shortage of generating plant, the general interest requires a very severe restriction of the employment of electric heating.

Further sections of this important paper deal with the types of apparatus and their regulation both manual and automatic and with the principles upon which a national policy should be based.

M. Ulmer deals with the details of construction of the poêle or stove which is widely used for space heating and not only in country districts.

A National Fuel Policy

The final paper by M. Véron sets out conclusions in very general and somewhat abstruse terms drawn from the whole of these studies and reports with recommendations for a national fuel policy. It is interesting to note the suggestion (reminding one of Mr. Lyle's proposed excise duty on coal) that "to make waste costly and economy a paying proposition" the selling price of all combustibles should be raised appreciably, counterbalanced by a reduction in taxation so that the cost of living would not be increased. This paper might well be studied if and when we in Great Britain come to formulate a comprehensive policy, but for the moment it is too tightly compressed to lend itself to a brief abstract.

Journal des Usines à Gaz

The *Journal* presents two technical papers—The possibility of employing lamp oil (kerosene) in the enrichment of water gas. and calculations of the capacity of mains and services by means of a nomogram which is printed on a "folder" (issued loose) with instructions for its use—and by an account of the inauguration of the 17th Salon des Arts Ménagers, an annual exhibition somewhat similar to our "Ideal Homes" which has been interrupted for the last seven years, with particular emphasis on the Allée du Gaz in which all the latest gas appliances were on show. For the first time the central position was occupied by the pavilion of "Gaz de France." Our contemporary is critical of some of the exhibits and, while excusing the few lapses by the shortage of materials, expresses the hope that in the near future the ticket "prototype" may disappear—just as we long for the last of "for export only."

"Pétrole lampant" or Kerosene is defined as the first fraction in the distillation of raw petroleum after the petrol (spirit). The distillation specification is that a minimum of 50% must distil before 255°C and 80% before 285°C. Although the quantities available are generally small and the price high the fact that it is not used as a fuel has led to the allocation of a considerable quantity to the gas industry to make up for the serious shortage of gas oil. Trials show that it is quite satisfactory as an enricher in the CWG plant.

The nomogram serves to determine the loss of pressure and other derivatives based on the formula

$$* \quad P^2 - p^2 = k \cdot \lambda \cdot \gamma_o \cdot \frac{Q^2 L}{D^5}$$

γ = Kgs. per m³ of gas.
L = length in Km.
Q = m³/hour
D = diameter in mm.

where λ (the coefficient of friction) = 0.0134 + 1.853 Reynold's Number. The mathematical treatment of the subject in the article by M. G. Poirier should be of considerable interest to the distribution engineer.

A joint committee of nine members, four representing the Gas Industry and four the Coal Industry, has been set up to regulate the supply of surplus coke-oven gas to the gas industry. The independent Chairman has a casting vote in case of equal voting.

In France, as in Britain, the position of coal stocks at the gasworks is much more favourable than it was last spring—a position which is reflected in unsold stocks of coke, about which managers are exhorted not to wait for official allocations but to go out among their prospective clients to secure sales. Gas sold in January was only 1% down on the same month of 1947.

PURCHASE TAX ON GAS APPLIANCES

IN his first Budget on Tuesday week, Sir Stafford Cripps announced an increase in the rate of purchase tax on gas space and water heating appliances from 75 to 100%, and a reduction in the rate on domestic and office lighting fittings from 50 to 33⅓%.

When deciding last year to place purchase tax on certain types of gas appliances, the then Chancellor of the Exchequer, Mr. Hugh Dalton, informed the British Gas Council that the tax on gas water heaters would "again be considered in the light of circumstances ruling when the tax is next reviewed."

On behalf of the Council, the General Manager, Mr. J. R. W. Alexander, drew the attention of the Chancellor, Sir Stafford Cripps, at the time he was preparing his recent Budget, to the then prevailing circumstances, which reinforced the previously expressed views of the Council that fuel economy is not secured by, and undesirable consequences arise from, the placing of heavy taxation upon appliances which consume fuel in the most efficient and economical manner.

The present circumstances were summarized as follows:—

(a) A deterrent effect upon the consumption of gas—especially by poorer consumers, many of whom have no alternative fuel apparatus—has been occasioned, since the imposition of the tax, by marked rises in authorized gas prices. These have been necessitated by substantial increases in the cost of gas oil and coal. If, owing to further increases in these and other costs, gas prices continue to rise the deterrent effect upon consumption will be increased.

(b) The incidence of the tax upon gas appliances falls increasingly heavily upon poorer consumers, owing to their reduced spending power. Further, it increases the cost of housing and re-housing, thus being prejudicial to the Government's demand for price stabilization.

(c) The number of gas appliances which, after years of service, need replacement in the interests of safety, efficiency, and economy continues to rise. The tax, therefore, inflicts particular hardship upon poorer consumers, who cannot afford necessary replacements.

(d) The addition of a heavy tax to the cost of gas appliances leads to evasion and encourages recourse to other fuel apparatus which is less well made, efficient, and safe. The demand for such apparatus has not fallen as has the demand for gas appliances.

(e) The response of the public to the Government's appeal for fuel economy—in which the gas industry has fully co-operated—has been such that gas undertakings have been generally able to maintain adequate supplies of gas for existing domestic consumers.

(f) The amount of gas which can be made available for consumption is controlled by the limitation upon the use of oil for gas manufacture, the restricted amount of gas coal available, the continued shortage of gas manufacturing and distribution plant, and the possible need for the increased extraction of benzole.

(g) The installation of new gas appliances is restricted to priority requirements—namely, new housing and re-housing projects, and consumers in need—owing to the acute shortage of pipes and fittings.

(h) The manufacturers of gas appliances have had to discharge large numbers of skilled workers specially trained and experienced in the manufacture of such appliances, especially water heaters. This unduly penalizes production and development and will render difficult the attainment of maximum output when this is required.

(i) Purchase tax was imposed, not to raise revenue, but to help to reduce fuel consumption following upon the fuel crisis which preceded the introduction of the Budget in April, 1947. Although the need for fuel economy continues, a crisis no longer obtains, and the desired saving can more effectively and equitably be obtained by other means.

The case for the exemption of gas apparatus from purchase tax was given in detail in the two documents submitted by the British Gas Council to the Chancellor of the Exchequer following the introduction of his Budget in April, 1947. The contents of these documents remain generally relevant to the issue.

The Council expressed the hope that the exemption of certain gas appliances from liability to purchase tax might be extended to the remaining apparatus, especially water heaters and lighting equipment. Arrangements have been made for the matter to be debated during the proceedings in Parliament on the Finance Bill. The Budget proposals regarding purchase tax are given in detail in Customs and Excise Notice No. 78L, but Group 12, dealing with fuel appliances, is inaccurate in that it would appear to extend purchase tax to gas appliances (*e.g.*, gas cookers) not now or under the Budget chargeable to purchase tax.

MANCHESTER TO BUY RICH OIL GAS

A new and interesting feature of co-operation between two important industries is revealed by the confirmation by the Manchester City Council of an agreement reached between the Corporation and Petrochemicals, Ltd., sponsors of a new petroleum-chemicals plant at Partington, Cheshire. Under the terms of this agreement, Petrochemicals, Ltd., will supply daily, by direct pipeline to the City's gas-works at Partington, 600,000 cu.ft. of high calorific value residual gas from the Company's "Catarole" plant which will commence the production of aromatic hydrocarbons and olefinic gases towards the end of the year.

The olefines will be used for chemical synthesis while the residual gases, consisting mainly of methane, hydrogen and a little ethane, will be eminently suitable for dilution and subsequent distribution as part of the normal town gas supply.

The "tail" gas to be supplied will have less than 5% of inert constituents and less than 0.6% oxygen. It will be free from sulphuretted hydrogen, tar, and oil; the naphthalene content will not exceed 0.1 grains per 100 cu.ft. and the calorific value will be approximately 890 B.Th.U per cu.ft. The gas closely resembles natural gas.

The Gas Department proposes to use the "tail" gas for the enrichment of blue water gas from a new plant now under construction at the Partington works by Humphreys & Glasgow, Ltd. The blue gas using coke as the basic fuel, will have a calorific value of 290 B.Th.U. per cu.ft. and the quantity required for diluting the 600,000 cu.ft. of oil gas will be approximately 1,650,000 cu.ft. per day. Any balance of blue water gas production not required for dilution purposes will be enriched in the normal way by gas oil.

On an annual basis the extra quantity of gas provided by the project will be of the order of 800 million cu.ft., representing about 9% of the total gas made in Manchester.

Apart from the physical advantages of an increased supply of gas at a relatively early date, had the equivalent quantity of gas to be manufactured in the normal way in a coal carbonizing plant, capital expenditure of some £250,000 would be incurred and approximately 53,000 tons of coal per annum required, together with additional carbonizing labour. Alternatively, had it been decided to make an equivalent volume of carburetted water gas, nearly 1½ million gall. of gas oil annually would be required for enriching purposes. Being an import from the U.S.A. the purchase of gas oil would involve dollar expenditure.

Leaving out of account, however, these aspects of the proposition, the adaptation of the rich oil gas to town gas use, on a thermal basis, will save either 30,000 tons of coal annually or one million gall. of gas oil. Whether the project is viewed from the coal economy angle or from the dollar saving aspect, it will make a useful contribution to the national economy.

Negotiations on the technical and commercial aspects of the project have been proceeding for some time between representatives of the Gas Department and Petrochemicals Ltd., and the agreement now reached, which is the first of its kind in the country, illustrates the value of co-operation in making the best economic use of the products of industry.

THE GAS BILL IN COMMITTEE STAGE

THE Standing Committee on the Gas Bill resumed its deliberations after the Easter recess on April 7, when the constitution of the consultative councils, as proposed in Clause 9 of the Bill, was again under consideration. The proposal is that not less than half the members shall be appointed from a panel of persons nominated from among members of local authorities in the area by such associations as appear to the Minister to represent those authorities, and the remainder "after consultation with such bodies as the Minister thinks fit, to represent commerce, industry, labour, and the general interests of consumers, &c."

Colonel R. S. Clarke (C., East Grinstead) moved an amendment to insert after "fit" the words "including the appropriate organizations of persons in the employment of the Gas Council and the Area Boards," and it was agreed to take this in conjunction with another amendment to leave out "labour" and to insert "gas workers." Colonel Clarke suggested that "labour" now seemed an old-fashioned term. The Bill itself required that the Minister should appoint representatives of labour, and it seemed consistent that he should consult the appropriate organizations.

The Parliamentary Secretary to the Minister of Fuel and Power (Mr. Robens) said the function of the consultative councils was to look after consumer interests, and it would be wrong to indicate the associations of labour which must be consulted without at the same time laying down the associations which should be consulted representing commerce or industry. There was no case at all for the workers in the industry to sit on consumer councils.

Mr. Gaitskell said there would be nothing to prevent the chairman of a consultative Council, who was himself a member of the Area Board, and, to that extent, in a managing capacity, from bringing with him to a meeting of the consultative council any expert he liked from the Area Board staff to explain and deal with particular problems.

The amendment was by leave withdrawn.

Keeping Gas Separate

Section (4) of Clause 9 deals with the duties of the consultative councils and refers to matters affecting the supply of gas. Colonel Clarke moved an amendment to insert after "gas" the words "coke, or by-products."

Mr. Gaitskell said there were several reasons why, after careful consideration, they came to the conclusion that the consultative councils should be made responsible only for gas, the only product in the sale of which to the public they would have a monopoly. Gas, unlike coke and by-products, had been the subject of much legislation in the past as regards consumer protection. On the other hand, coke was already covered in the Coal Nationalization Act by both the industrial and the domestic coal consumers' councils, now actually concerned with consumer protection in the case of coke. Coke was handled in the main by coal distributors, and if they had to choose between the gas consultative councils and the domestic and industrial consumers' councils, the case for the latter was overwhelming. There was the further point that strictly speaking the gas consultative councils could only deal with gas coke, whereas it seemed more sensible in dealing with this matter, to group both gas coke and hard, or metallurgical, coke together.

Replying to Sir H. Lucas Tooth (C., Hendon S.), Mr. Gaitskell agreed that some arrangement would have to be made, when the Area Boards were set up, for their contact with, and, indeed, possible close association with the Domestic Coal Consumers' Council. At the moment one of the members of that Council was the technical officer of the London and Counties Coke Association which was, in effect, the coke distributors, so that link existed at the moment in the person of that gentleman. As to by-products the position was different, because the gas industry controlled only a proportion of the crude products, such as coal tar, and a much smaller proportion of the products of tar distillation, so there would not be much sense in making the gas consultative councils responsible for by-products.

Lieut.-Colonel W. E. Elliott (C., Scottish Universities) said the connexion between the coal consumers' councils and the gas consultative councils which the Minister had indicated was most shadowy, and later he would have to make a more organic connexion between the two. The process of nominated criticism, however, which was the fundamental remedy that the Minister brought forward as a result of having swept away elected criticism, was already leading him into difficulty and he believed it would lead him into greater difficulty as time went on.

The amendment was by leave withdrawn.

Meetings in Public

The question of publicity for the proceedings of the consultative councils was raised by Sir H. Lucas Tooth in an amendment providing that "every meeting of a Gas Consultative Council to consider a matter which is the subject of a representation mentioned in the previous sub-section shall be held in public session and due notice thereof in writing shall be given by the Council to the person by whom the representation was made, but such person shall not, unless the Council shall otherwise direct, be entitled to be heard at such a meeting."

Mr. Gaitskell said the suggestion was that the councils should meet in public all the time and have the Press in always. "We say, let them decide themselves, just as local committees now can decide whether they want to have the Press in or not. . . As for publication, we have provided for annual reports of the consultative councils. If a consultative council has a row with an Area Board and wishes to put it all in the annual report, it is free to do so; but negotiations may take place between the consultative council and the Area Board."

The Committee divided and the amendment was negatived by 21 to 8.

After minor amendments had been dealt with, Clause 9 was ordered to stand part of the Bill.

Clause 10 deals with annual reports of Area Boards and the Gas Council, and Section 2 provides that the reports shall set out any direction given by the Minister to the Board or Council unless it is against the interests of national security to do so. An amendment moved by Colonel Clarke to add "in which event it shall be stated in such report that the Board of Council has been so notified by the Minister," was negatived.

Annual Reports

When the Committee resumed on Thursday, Mr. N. Bower (C., Harrow, W.) moved an amendment to substitute "shall" for "may" in the section referring to the presentation of annual reports by the consultative councils. The amendment, he said, was designed to keep the councils up to scratch, to ensure that each council would review its own record every year, and help to secure consistency with regard to their activities.

Mr. Gaitskell said they had not originally contemplated that it should be mandatory on consultative councils to produce reports; in the Electricity Act it was not mandatory. There was something in Mr. Bower's argument, however, and if he would be kind enough to withdraw the amendment he would undertake to think the matter over and, if necessary, to introduce an amendment at the report stage.

The amendment was by leave withdrawn.

Section (5) of Clause 10 provides that "the Minister shall lay before each House of Parliament a copy of the report made for each financial year by each Area Board and the Gas Council, and shall at the same time lay before each House of Parliament a report with respect to the exercise of his functions during that year under this Act, except as regards matters which in his opinion it is against the interests of national security to disclose."

Colonel R. S. Clarke moved an amendment to insert after the ninth word "as soon as practicable after receipt thereof," and there was also an amendment to leave out the words "at the same time" and substitute "as soon as possible after the end of each financial year of the Gas Council." Colonel Clarke urged that there should be no unnecessary delay in the presentation of the reports simply through some unexpected hold-up by one of the 12 Boards.

Mr. Robens replied that what they were anxious to do was not to have a succession of reports from the Area Boards, but rather that they should be able to lay the Area Boards' reports down at the same time with the report of the Minister. A later clause defined the financial year, which would be the same for all the Area Boards and the Gas Council. The reports would, therefore, refer to the same period of accounts and so would the Minister's report as to his functions under the Bill. Parliament would have before it simultaneously the accounts and reports of every Area Board, the accounts and reports of the Gas Council, and the Minister's report as to his functions under the Bill. It seemed that was the sensible and most convenient way for Parliament to deal with the matter.

The amendment was by leave withdrawn, and Clause 10 was ordered to stand part of the Bill.

Compulsory Purchase of Land

Three amendments were tabled in reference to Clause 11, which deals with the compulsory purchase of land. Section (2) provides that an Area Board may be authorized "to purchase compulsorily a right to place a gas pipe across land, whether above or below ground, and to repair and maintain the pipe, without purchasing any other interest in the land." Mr. P. G. Roberts (C., Ecclesall) moved to omit the words "across land," and said there should be retained by the property owner of a public or private garden the right to prevent it being dug up by the gas undertaking.

The Attorney General (Sir Hartley Shawcross) suggested that if the amendment were carried it was difficult to see how any new mains could be laid at all in urban areas where there might be buildings, and where it was quite essential to put the mains underneath them, and again, where it might be essential to provide for a proper system of mains to put them through pleasure grounds. The present powers were identical with those which the House gave in Section 9 of the Electricity Undertakings Act, 1947.

The amendment was by leave withdrawn.

Mr. Roberts then moved to omit the words "whether above or," and pointed out that while electricity lines above ground were carried on pylons, an overground gas main would render the use of adjacent ground impracticable. It could not be used for farming or recreation.

The Attorney General said it was perfectly clear that in the majority of cases the Area Boards would want to lay their mains underground, but a practical difficulty in putting such an amendment into the Bill was that there might be some cases where it was really quite impossible to do anything else than to leave the pipe above ground.

The amendment was by leave withdrawn, and the Clause was ordered to stand part of the Bill, after a division, in which voting was: Ayes, 22; Noes, 11.

A Constitutional Question

On Clause 12, dealing with the powers of Areas Boards and the Gas Council to promote and oppose Bills, Major J. R. Boyd-Carpenter (C., Kingston-on-Thames) moved an amendment to omit the words "with the consent of the Minister" (in relation to promoting Bills) and "without any such consent" (in relation to opposing Bills). The point of substance in the clause, he said, was that the Gas Council and the Area Boards would be deprived of the right to approach Parliament without the consent of the Minister, although that right had been and was enjoyed by many other bodies and had been enjoyed for many years by the companies in the industry. "In general it is a matter which this Committee should watch with some suspicion when any restriction is attempted on the right of anybody in this country to come to Parliament asking for powers or to come to Parliament by way of petition."

The Attorney General said the amendment raised a rather academic constitutional question. The creation of nationalized industries under the general control of Ministers, who were themselves responsible to Parliament for their general conduct, raised an entirely novel position from that particular point of view. If such industries, which by their very constitution were made subject to general ministerial control, could petition Parliament independently of such control one would get the curious result that a Minister, although generally responsible, as here, for the co-ordination of fuel and power, and having general powers of supervision over the particular industry, might find himself in the position in the House, to which he was responsible for the general organization of that industry, having to come and oppose Private Bill legislation which the industry had put forward. That would be a most curious constitutional position, and one of great equivocation and inconvenience.

The amendment was negatived and the Clause was ordered to stand part of the Bill.

Clause 13, dealing with taxation, was approved with slight amendment.

Mr. L. J. Pitman (C., Bath), as a spelling reformer and a printer, raised the question of the spelling of "nationalization." He welcomed the use of the "z" in "organization" and "carbonization" and asked how the Government proposed in future to spell "nationalization"—with "s" or "z"?

Mr. Brendan Bracken (C., Bournemouth) said it was an ugly word anyhow; why make it more ugly by putting in a "z"?

Mr. Gaitskell said he was advised that this need not be dealt with by amendment, but it was a printing matter and they would deal with it in that way.

Clause 14 (liabilities of Area Boards and Gas Council in actions, &c.) was under discussion when the Committee adjourned.

SHOULD CO-PARTNERSHIP DIE?

The Committee of Management of the Cambridge University and Town Gas Light Company's Co-Partnership Scheme is vigorously implementing the decisions made at a mass meeting of co-partners held recently. A deputation consisting of W. H. Wosencroft (Personnel Assistant), H. R. Stanley (Sales Supervisor), W. Purdew (Engineering Foreman), S. Watson (Retort House Charge Hand), T. Impey (Transport Section), R. Moden, and D. B. Staples (Distribution Department) was instructed to wait upon the Borough and County Members of Parliament and representatives of the Trade Unions, to present the views of co-partners at Cambridge. Interviews have already taken place with Mr. A. L. Symonds, M.P., and Mr. A. E. Stubbs, M.P., and one of the national officials of the British Gas Staff Association has agreed to meet the deputation in the near future. The results to date can be considered satisfactory and after the sympathetic hearings accorded to the deputation it is anticipated that the views submitted will be conveyed to those who are conducting the passage of the Gas Bill through Parliament.

A strong case has been worked out for the retention of co-partnership or for adequate compensation. The Cambridge scheme commenced in 1909, and at the end of the first year there were 161 co-partners. To-day the membership is 214. Since the scheme was started £75,239 has been distributed as bonus. The total sums paid for Gas Company's stock has been £50,210 and £22,571 has been withdrawn in cash. By withdrawing accumulated holdings of stock many members have been enabled to purchase their own houses. The withdrawal of cash bonus has proved of considerable assistance in providing additional cash for summer holidays, &c. The half-yearly dividend on co-partners' shares has also given a welcome addition to income, thus raising the standard of living. The scheme is administered by a committee of management consisting of the Chairman and Vice-Chairman of the Board, four members nominated by the Board and six co-partners elected by the co-partners. Each of these six members must have been at least five years in the employ of the Company, one of them must work in a retort house, one in the yard or workshops, one in the distribution department, and one as a clerk. During the past 20 years, the rate of bonus has never been less than 5% and for nine years of this period was 8¼%. The bonus is paid on all salaries and wages, inclusive of overtime payments. Even at the lowest rate of bonus the loss of income by a co-partner of 25 years of age, retiring at 65, with average earnings £300 per annum would be £600 (bonus at 5% =£15 per annum for 40 years). In addition dividends on shares accumulated during that period represent £300 approximately.

Under normal circumstances the rate of bonus is governed by a sliding scale based on the cost of gas to the consumer. In the event of the price being reduced, the bonus increases, while an increase in the price of gas means that the co-partner receives less bonus. It is therefore in the interests of all who are concerned with the production and distribution of gas and by-products to see that every effort is made to keep the price of gas as low as possible. The principle of co-partnership properly applied reduces the possibilities of strikes and lock-outs to negligible proportions, as it leads to joint consultation and the institution of Development Councils as provided for in the Industrial Organization Bill introduced to Parliament in 1947.

That the bargaining power of trade unions is weakened by co-partnership is an outworn contention as co-partnership gives the opportunity for employers and employed to work together not only to their mutual advantage, but also for the benefit of the consumer. That bargaining power is weakened is not proved by the workings of the National Joint Industrial Council for the Gas Industry which has worked well and given all gas workers a fair wage, a 44-hour week and a fortnight's paid holiday annually, irrespective of whether they were co-partners or not.

The continuance of co-partnership would mean an extension to other nationalized industries of the same privileges.

The deputation submits that such an excellent thing as co-partnership could and should be extended to other industries under similar terms.

To make provision for the retention of co-partnership would, it is submitted, need very little alteration to the Gas Bill. The substitution of British Gas Stock or a special co-partners' issue for the present gas companies' stock would be the only major alteration necessary to existing co-partnership schemes. It is suggested that the present situation offers is a magnificent opportunity for the Government to show the world what can be done by a co-operative effort in which the employer and employee are together identified.

If co-partnership is wiped out it will mean that one of the most promising of industrial experiments for 50 years will die before it has been given a chance of useful life. It is an inheritance which workers in the Gas Industry do not wish to see lightly flung away.

If it is found impossible to continue co-partnership compensation should be computed in such a way as to ensure that co-partners suffer no loss of income throughout their normal period of employment. To achieve this, co-partners should be compensated at the rate of £233⅓% for each £100 of "B" stock held. Compensation for prospective loss of income should be based on the estimated years of service which can fairly be expected. The terms of compensation to co-partners should be clearly and explicitly stated in the Gas Act, and should not be dependent upon regulations to be made by the Minister subsequent to the passing of the Act.

PHYSICAL SOCIETY EXHIBITION

IMPERIAL COLLEGE, S.W.7, again housed the annual exhibition of the Physical Society on April 6-9, an event as popular and impressive this year as ever. From the gas industry's viewpoint, however, there was less of interest, if only because the Gas Light and Coke Company was not represented. Nevertheless, a number of firms intimately connected with the industry were actively present and some of these are mentioned in the following notes.

The **Automatic Coil Winder and Electrical Equipment Co., Ltd.,** exhibited, among other types of equipment, an interesting multi-range electronic test meter which was virtually two instruments in one. It was basically a highly stable valve millivoltmeter, which could be used up to very high frequencies. With its associated multipliers, shunts, and internal supplies, it would measure A.C. and D.C. voltage, D.C. currents, resistance, capacity, and output power as simply as any ordinary multi-range measuring meter.

Bristol's Instrument Co., Ltd., showed mainly mercury-float type orifice plate—flow meters, but there were also examples of multi-cam impulse-sequence cycle controllers, predictor proportional electric potentiometer controllers, and recording magniset free-vane air-operated pressure controllers.

A large variety of instruments was exhibited by the **Cambridge Instrument Co., Ltd.,** mainly concerned with measurement of gases. One interesting example was a dissolved oxygen recorder for use on boiler feed water to prevent boiler corrosion. Operating upon the thermal conductivity principle, embodying a katharometer, the outfit was designed to provide accurate, continuous records which gave immediate indication of any increase in the dissolved oxygen. The magnetic oxygen recorder shown depended on the change of paramagnetism of oxygen with temperature, while the CO indicator demonstrated the measurement of gases by catalytic combustion on a hot wire. A katharometer for hydrogen in air illustrated the thermal conductivity method of measuring gas composition, and a large variety of gas mixtures could be measured by this means.

Elliot Brothers (London), Ltd., well known for the manufacture of gas analysis and flow measurement equipment and many instruments used in the gas industry, exhibited some interesting pieces of apparatus, not the least of which was a high stability power frequency valve generator for the provision of a highly stabilized A.C. supply for instrument testing purposes. Also shown were a thermocouple wattmeter, a three-phase unbalanced load wattmeter, a dynamometer voltmeter, a black-white controller designed to switch on and off lighting loads at a given light intensity, a D.C. amplifier of the magnetic inverter type, a sensitive valve voltmeter incorporating a D.C. amplifier, a dewpoint recorder, and an optical electronic alignment controller.

In addition to a wire tensioner, an enamelled wire tester, a quick response Duplex recorder, a Noflote control, and a demonstration of Servo mechanism, **Evershed & Vignoles, Ltd.,** displayed an interesting gas flow transmitter. This was capable of operating on a differential head as low as 2 in. water gauge, or even less, rendering it suitable for use with low pressure gas mains such as are common in steelworks. The instrument consisted of a beam balance resting on a knife edge. To one end of the beam was attached a float displacer and to the other end a magnet, the latter being surrounded by a coil which carried the anode current of a triode valve. Any displacement of the magnet closed external biasing contacts which increased or decreased the anode current until the pull exerted by the coil balanced the weight of the float displacer. The latter was so shaped as to compensate for the square law of the orifice plate, and thus the current through the coil bore a linear relationship to the gas flow. The anode current was transmitted to the distant receivers, which were simple D.C. milliammeters and milliampere-hour meters.

The Foster Instrument Co., Ltd., had three particular exhibits. Two indicating automatic temperature controllers, one of which was fitted with a hunting cycle suppressor, each controlled the temperature of a small electric furnace. A two-point recorder recorded the temperature of each furnace, demonstrating the effect on the temperature control of the hunting cycle suppressor, which reduced to a negligible amount the cyclic fluctuations usually experienced with automatic temperature control. Introscopes for the internal examination of inaccessible surfaces were also shown and demonstrated.

A very wide range of exhibits was shown by **Griffin & Tatlock, Ltd.,** among them a microid gas diffusion apparatus. This simple apparatus was intended for use in rapidly demonstrating the diffusion of gas into a porous pot, the open end of which was fitted with a rubber stopper provided with a U-tube containing platinum contacts and mercury. The change in pressure inside the pot caused a change in the mercury levels, thus completing an electrical circuit and causing a low voltage lamp to become illuminated. Other apparatus shown included a microid bar pendulum, microid rotational inertia apparatus, electrostatics apparatus, microid resistance units, &c.

The **Rotameter Manufacturing Co., Ltd.,** exhibited a glass-tube rotameter of the well-known form of variable arc flowmeter with a frictionless rotating indicator, a recording rotameter in which the tapered metering tube was of metal, and various forms of flow alarms.

Radio-frequency cables were a feature of the stand of the **Telegraph Construction & Maintenance Co., Ltd.,** together with some interesting uses for plastics. The rest of the exhibit was devoted to the range of Telcon metals, the restricted range of four bi-metals which have now been extended to include a range of trimetals with electrical resistance graded from 8 to 80 microhms/cm³ by the inclusion of a low-resistance strip between high and low expansion elements.

W. Edwards & Co. (London), Ltd., exhibited an interesting range of equipment connected with the somewhat unique industry, high vacuum technique. Rotary and diffusion pumps were featured, together with a range of vacuum gauges. An interesting exhibit was a new vacuum switch, intended as a safety device for vacuum plant employing high tension electrical equipment. It could be arranged to isolate electrically the plant if the desired vacuum was not attained and it would also be employed as a control for incorporation in low pressure systems where electrical circuits are required to be automatically switched at pre-set gas pressures between 15 and 500 mms. Hg.

Combustion with Oxygen and Oxygen-Enriched Air

[A "Gas Journal" Abstract]

The following is an abstract of a paper by Dr. **H. R. Fehling,** *F.Inst.F., to the South Wales Section of the Institute of Fuel and the Institute of Petroleum.*

We are now in sight of a development on a large scale of the use of oxygen to enrich or even displace air not only for the purpose of gasification, but for high-temperature heating processes and new methods of power production. A close study of the fundamental side of combustion with oxygen is therefore required in order to see the problem as a whole and to anticipate the most likely trends before embarking on very costly experiments on a large scale.

The most obvious consequence of replacing air by oxygen is to reduce the gas volume produced by combustion and to increase the heat content of the combustion products. When burnt with air the heat content of the products of combustion of carbon, hydrogen, and most hydrocarbons is almost exactly the same, 100 B.Th.U./cu.ft. But when using oxygen that of hydrogen is roughly 300 B.Th.U./cu.ft., whereas that of carbon is not less than 500 B.Th.U./cu.ft., the highest value for any fuel.

But this is only one criterion, and since oxygen is costly its consumption per 1,000 B.Th.U. generated is another of some importance. Figures given show that this is of the order of 2 cu.ft. for all high-grade solid and liquid fuels, being highest for low-grade solid fuels owing to their moisture content—for peat it is 2.23—and lowest for fuels richest in CO, for CO itself, 1.465. The relation between the volume of oxygen required for combustion and the volume of gaseous products resulting from it is another important criterion. This ratio is 1 for carbon and drops to 0.2 and less for lean gaseous fuels. If, therefore, 1 cu.ft. of oxygen is used in a furnace only 1 cu.ft. of waste gas will leave it in the case of fuels rich in carbon, but not less than 4 to 6 in the case of producer gas. It is doubtful which conditions are technically and economically preferable.

Volumetric and thermal data are presented covering complete combustion with pure oxygen of the principal pure gases, and solid, liquid, and gaseous fuels. There is difficulty in calculating the composition of combustion products at temperatures above those attained in combustion with air, say, 2,000° C., owing to dissociation, which becomes very large when air is replaced by oxygen. A method has been developed for the direct calculation of the true gas composition up to about 2,500° C., which is to be incorporated in the next edition of "Technical Data on Fuel."

The dissociation of CO_2 begins to be noticeable at 1,500° C., at 2,000° C. no more than 10% is decomposed into CO and O_2, but at 2,200° C. decomposition of molecular into atomic oxygen becomes significant, increasing rapidly to 2,500° C. when almost half is dissociated. The result is an expansion in volume due to chemical changes as distinct from thermal expansion.

The corresponding picture for H_2O is similar in many respects but complicated by the appearance of the radical OH. The gas composition becomes very complex when mixtures of CO_2, H_2O, and N_2 are raised in temperature from 2,000° C. to nearly 3,000° C., as would be done by replacing air by pure oxygen. A number of curves, together with 11 diagrams, are presented, show-

ing the effect of these considerations in the combustion of various fuels with air, oxygen, and oxygen-enriched air.

The most important objectives in raising flame temperatures by oxygen enrichment are an increase in thermal efficiency and an increase in the rate of heat transmission to the charge. A table shows the influence of oxygen enrichment in the thermal efficiency of a furnace which the waste gases leave at 1,500° C., but these figures are to be discussed further since the actual value of the increase must be balanced against the power absorbed in oxygen production. Heat transmission requires further study. Radiation is certainly much stronger in an oxygen flame, but it is now known how much. The new and untapped possibilities of transmission by convection may have great practical importance.

Implications of these data involve the thermal efficiency of a self-sufficient heating process, in which the production of oxygen would be integrated into the process. The whole of the waste gases leaving the heating appliances would be used to provide the energy for oxygen production, the use of the gas turbine being mentioned. Such a process with continuous furnaces operating at 1,500° C. might have an efficiency of 70%. Oxygen enrichment appears to increase the risk of roof and wall failure from the intensely hot flame, but "as long as the fuel supply to a furnace and the heat generated in it are not increased, there is no danger to the walls, no matter how high the flame temperature, provided the heat can be distributed evenly." These and other problems are to be discussed further.

COKE AND CREOSOTE EXPORTS

The first specially licensed post-war shipment of 2,400 tons of London coke for Helsinki, Finland, has been loaded from the Gas Light and Coke Company's works at Beckton into the S.S.*Nina*.

A short ceremony took place on the works jetty on April 8, when Mrs. Joan Robins, B.B.C. television cook, presented the *Nina*'s skipper with a cake, decorated with a large pink Mr. Therm, for the Mayor of Helsinki—the cake to be given to a children's hospital or other institution.

Before the war about 500,000 tons of British coke were exported annually to Scandinavia, and this first cargo was allocated by the Government to Finland.

The Gas Light and Coke Company is also sending creosote to the United States. A typical recent cargo was 7,500 tons from the by-product works at Beckton, shipped in the S.S.*Clydefield*. The creosote is pumped from barges into the *Clydefield*, and its export to America produces dollars for this country.

EDUCATION FOR INDUSTRY AND COMMERCE

Mr. George Tomlinson, Minister of Education, announced at the annual meeting of the County Councils Association the appointment of Lt.-Gen. Sir Ronald Weeks, K.C.B., C.B.E., D.S.O., M.C., T.D., as first Chairman of the National Advisory Council on Education for Industry and Commerce.

Stating that he was now taking urgent steps to constitute the Council, Mr. Tomlinson said that he had accepted in principle the findings of a Working Party, which recommended in December the establishment of a National Advisory Council on Education for Industry and Commerce to advise him on the national policy necessary for the full development of education in this sphere. In making its recommendations, the Working Party pointed out that at this time, as never before, there is a real need for well-trained craftsmen, technicians, technologists, scientists, research workers, and managers."

Lt.-Gen. Sir Ronald Weeks, who is a graduate of Cambridge University and captained the Cambridge University Football Eleven in 1912, is Deputy Chairman of Vickers, Ltd., Chairman of the English Steel Corporation Ltd., and a director of other firms. He was awarded the D.S.O., M.C., and Croix de Guerre in the 1914-18 war, and held various staff appointments in the Home Forces and the War Office during the 1939-45 war, being appointed Director-General of Army Equipment in 1941 and Deputy Chief of the Imperial General Staff in 1942.

The Staff and Employees of the Rhymney and Aber Group of Gas Companies were entertained to dinner by the Directors at Caerphilly on April 1. Colonel W. Moncrieff Carr, O.B.E., T.D., Chairman of the United Kingdom Gas Corporation, presided, supported by the following Directors: Mr. J. Prosser Jones, Brigadier H. F. H. Jones, M.B.E., Vice-Admiral A. L. Snagge, C.B., Mr. J. M. Whittington, and Mr. Barton Grainger (General Manager). Among the visitors were Messrs. Alan West (Manager, Bargoed Coke Oven Plant), D. E. West (Engineer and Manager, Aberdare Gas Company), W. T. Kenshole (Engineer and Manager, Merthyr Tydfil Gas Company), A. Pickard (Engineer and Manager, Llanelly Gas Company), J. R. Munroe (Secretary, Aberdare Gas Company), I. J. Ferris (Secretary, Gowerton), and A. E. Martin (Secretary, Merthyr Tydfil) Responding to the toast of "Our Hosts," Colonel Carr referred to the excellent spirit in the Rhymney and Aber Group and said he was sure that the success of the undertaking was due in no small measure to the fine team work between management and employees.

THE GLOUCESTER-DURSLEY LINK-UP

Despite inclement weather there was a large and representative attendance at the inauguration of the bulk supply of gas from the works of the Gloucester Gas Light Company's works to the distribution system of the Dursley Gas Light and Coke Company, a report of which was published in the "JOURNAL" last week. Commenting on the completion of the scheme, Councillor B. C. Meehan, Mayor of Gloucester, remarked that if William Murdoch —not to be confused with "Stinker"—had been present he would have exclaimed "That's some going."

The photograph on the left shows the opening of the valves by which gas was transmitted from Gloucester and received into the Dursley system. (Left to right: Councillor W. A. Walters, Chairman of the Dursley Rural District Council; Mr. F. J. Bloodworth, Chairman of the Dursley Gas Light and Coke Company; Sir Leslie Boyce, Chairman of the Gloucester Gas Light Company, Alderman Sir Lionel Darell, Gloucester County Council; and Councillor B. C. Meehan, Mayor of Gloucester.

The photograph on the right shows officials and Directors of the Severn Valley Gas Corporation, South Western Gas and Water

Corporation, Gloucester Gas Light Company and the Dursley Gas Light and Coke Company. Reading left to right: Mr. R. S. Snelling, J.P., F.C.I.S., General Manager, Severn Valley Gas Corporation, Mr. A. L. Morris, F.I.A.C., Commercial Manager, Gloucester Gas Light Company, the Mayor of Gloucester, Sir Leslie Boyce, K.B.E., J.P., Mr. W. A. Walters, Mr. G. M. Gill, M.I.C.E., Director, Severn Valley Gas Corporation, and Gloucester Gas Light Company, Mr. C. Holmes Hunt, Chairman, South Western Gas Corporation, Mr. A. T. Voyce, Director, Gloucester Gas Light Company, Mr. C. R. Ingham, M.Inst.Gas E., Chief Engineer, Gloucester Gas Light Company, Mr. W. A. Chard, Distribution Manager, Gloucester Gas Light Company, Mr. P. J. Purnell, Works Manager, Gloucester Gas Light Company, Colonel Sir Lionel Darell, Bt., D.S.O., Mr. F. J. Bloodworth, and Mr. F. Allen, General Manager, South Western Gas and Water Corporation.

THE REMOVAL OF HYDROGEN SULPHIDE FROM COAL GAS BY MEANS OF IRON OXIDE*

By G. U. HOPTON, B.A., B.Sc., A.M.I.Chem.E.,

Gas Light and Coke Company.

IT has long been recognized that iron oxide exists in several forms, but considerable confusion has been caused because of variation in the nomenclature used by different workers. Valuable work has been done in the past on the behaviour of iron oxide with hydrogen sulphide, for example, by T. G. Pearson and P. L. Robinson (1) but the first complete account of the nature of the reaction between hydrogen sulphide and the various forms of iron oxide, and of the reaction between oxygen and the sulphides of iron, was given by R. H. Griffith and A. R. Morcom(2). Griffith and Morcom prepared the seven known forms of ferric oxide which, following the accepted modern nomenclature, are as follows:

(1) α-ferric oxide, by dehydration of its monohydrate at 300° C.
(2) α-ferric oxide monohydrate, by atmospheric oxidation of precipitated ferrous carbonate.
(3) β-ferric oxide monohydrate, by hydrolysis of dilute ferric chloride.
(4) γ-ferric oxide, by atmospheric oxidation of Fe_3O_4 at 110°, or by dehydration of its monohydrate at 250° C.
(5) γ-ferric oxide monohydrate, by oxidation of ferric sulphide in aqueous suspension.
(6) δ-ferric oxide monohydrate, by oxidation of precipitated ferrous hydroxide with hydrogen peroxide in presence of very concentrated alkali.
(7) amorphous hydrated ferric oxide, by precipitation of a ferric salt solution by alkali hydroxide or ammonia.

These oxides were prepared as powders and pressed into tablets, which were suspended from a quartz spring in a modification of the McBain-Bakr sorption balance, and the rate of sorption of hydrogen sulphide was measured.

α-Fe_2O_3 and γ Fe_2O_3 are characterized by induction periods in which no reaction with hydrogen sulphide takes place. Amorphous oxide is distinguished by an early diminution in the rate of reaction, which is attributed to blocking of the pores due to changes in the volume of the gelatinous material. δ-$Fe_2O_3.H_2O$ shows a very low rate of reaction, and β-$Fe_2O_3.H_2O$ suffers incomplete conversion to the sulphide because it exists only at a low PH.

In contrast to these five unsatisfactory materials, α-$Fe_2O_3.H_2O$ and γ-$Fe_2O_3.H_2O$ react immediately and rapidly with hydrogen sulphide. Over a considerable period of the reaction the rate of sorption of hydrogen sulphide is inversely proportional to the extent to which change has occurred. The rate of conversion is determined by the rate of penetration through the sulphide already formed, and is dependent upon the porosity of the material. A specimen of oxide which had been converted fully into sulphide, and then allowed to oxidize, was found by Griffith and Morcom to give a very low reaction rate with hydrogen sulphide, showing the effect of reduction in porosity by the deposition of free sulphur.

Variations in Reactivity

In the case of α-Fe_2O_3, the behaviour was found to be dependent on previous heat treatment, quite apart from the effect of porosity. Tests with this oxide which had been heated to 400°, 500° and 650° C. showed progressive reduction in the rate of reaction with hydrogen sulphide, and in fact the specimen which had been heated to 650° C. did not react at all until it had been in contact with the gas for more than three hours.

These important variations in the reactivity of the several forms of iron oxide relate to the sorption of hydrogen sulphide in an atmosphere of that gas, but they are confirmed by the work of R. H. Griffith and G. U. Hopton(3), in which district gas to which hydrogen sulphide and air had been added was passed through tablets of iron oxide. The concentration of hydrogen sulphide and oxygen in the gas mixture was adjusted to simulate that found normally in coal gas entering the purifiers, and the concentration of hydrogen sulphide in the outlet gas was determined at frequent intervals. The rate of flow of gas was high compared with that employed in works practice, and the bed of oxide was smaller in depth. Nevertheless the tests provide a comparison of the behaviour of the various forms of iron oxide when exposed to a stream of gas containing hydrogen sulphide and oxygen together. The most important results of these tests are shown in Fig. 1. First of all, it was found that the oxide should not be acid. For example, there is shown the behaviour of α-$Fe_2O_3.H_2O$ prepared by oxidation of ferrous carbonate prepared from ferrous sulphate and sodium carbonate with a PH of 8.5 There is also shown the behaviour of α-$Fe_2O_3.H_2O$ containing 4% of ferric sulphate and having a PH of 5.5 The performance of the acid sample is far inferior. As another example, the behaviour of γ-$Fe_2O_3.H_2O$ adjusted with sodium carbonate to a PH of 10 is shown as being satisfactory; but a sample of γ-$Fe_2O_3.H_2O$ without sodium carbonate and with a PH of 6 gave such a high slip of hydrogen sulphide from the start that it cannot be shown on the Figure. Similarly, γ-Fe_2O_3 with a PH of 8.5 (by addition of sodium carbonate) showed a break-point after 90 minutes, whereas γ-Fe_2O_3 with a PH of 3 gave a very high slip from the start. As for β-$Fe_2O_3.H_2O$, it has a PH of 5 and gave very poor results which could not be improved by neutralizing, because this form exists only at a low PH; it is not therefore shown in Fig. 1.

The best results are given by α-$Fe_2O_3.H_2O$. The next best form is γ-$Fe_2O_3.H_2O$, but in a given volume its low packing density renders it appreciably less effective than α-$Fe_2O_3.H_2O$. All other forms of iron oxide are very markedly inferior. The superior performance of α-$Fe_2O_3.H_2O$ prepared from ferrous sulphate and ammonium carbonate compared with that made from sodium carbonate is due to retardation of the reaction between iron oxide and hydrogen sulphide by sodium carbonate not washed out of the product.

Returning to the work of Griffith and Morcom, it is found that the product of the reaction between hydrogen sulphide and all the forms of iron oxide is $Fe_2S_3.H_2O$. This sulphide is stable only under certain conditions of temperature and alkalinity. It is stable in an atmosphere of inert gas, or in the presence of hydrogen sulphide if the temperature is below 20° C.; but at higher temperatures in the presence of hydrogen sulphide, $Fe_2S_3.H_2O$ is converted into FeS_2 and Fe_8S_9. For example, at 40° C. after three or four hours it was found that $Fe_2S_3.H_2O$ had been converted completely into 42% of FeS_2 (on an iron basis) and 58% of Fe_8S_9.

Effect of Alkalinity

Fortunately alkalinity exerts an appreciable stabilizing effect, so that the decomposition of $Fe_2S_3H_2O$ into FeS_2 and Fe_8S_9 does not occur below 90° C. when the PH is 8.0. But the beneficial effect of alkalinity does not extend to another change, namely the dehydration of $Fe_2S_3.H_2O$ into Fe_2S_3, which commences at a temperature of 40°-50° C. and becomes very marked at higher temperatures.

The conditions under which $Fe_2S_3.H_2O$ is stable are of the utmost importance in view of the very different behaviour of the iron sulphides on oxidation. $Fe_2S_3.H_2O$ is oxidized rapidly below 40°-50° C. to α-$Fe_2O_3.H_2O$, thereby regenerating the form of iron oxide which is most active for the absorption of hydrogen sulphide. Only in the case of oxidation in aqueous suspension is the product different; $Fe_2S_3.H_2O$ under this condition yields γ-$Fe_2O_3.H_2O$, which, although satisfactory for the absorption of hydrogen sulphide, is not so reactive as α-$Fe_2O_3.H_2O$. FeS_2 and Fe_8S_9, on the other hand, are not oxidized readily. They are oxidized extremely slowly, the former yielding much sulphate. Anhydrous Fe_2S_3 similarly forms iron sulphate on oxidation, together with some anhydrous γ-Fe_2O_3.

The guidance which knowledge of the nature of the reactions of sulphiding and oxidation provides for works operation is clear. So far as is practicable the temperature of the oxide mass should be maintained below 40° C. (104° F.); temperatures between 40° and 50° C. (104° and 122° F.) are undesirable; while temperatures above 50° C. (122° F.) are extremely dangerous because of the dehydration of ferric sulphide to give a substance which on oxidation forms a mixture of sulphate and inactive oxide. Acid conditions should be avoided, because they favour the decomposition of ferric sulphide into FeS_2 and Fe_8S_9, which are oxidized with great difficulty, and yield sulphate. The conditions which works operation should seek to maintain are temperatures below 40° C. (104° F.), and a neutral or slightly alkaline state, for in that case the ferric sulphide $Fe_2S_3.H_2O$ formed on sulphiding is converted into α-$Fe_2O_3.H_2O$, the most active form of iron oxide for purification.

The effect of PH may be considered further. The undesirable decomposition of $Fe_2S_3.H_2O$ into FeS_2 and Fe_8S_9 under acid conditions has already been described. There are however two further consequences of conditions of low PH. $Fe_2S_3.H_2O$ is decomposed by acid with evolution of hydrogen sulphide, so that removal of hydrogen sulphide is incomplete when iron oxide is used under conditions of marked acidity. The rate of reaction is also influenced by the PH of the oxide. When gas containing hydrogen sulphide is passed through iron oxide it is found that the rate at which the gas can be passed, while maintaining a given low concentration of hydrogen sulphide in the outlet gas, depends on the PH of the oxide. Higher rates of flow are possible with oxide which is neutral or alkaline than with oxide under acid conditions. There are, therefore, three reasons why acid conditions are to be avoided, namely, because (1) they promote the decomposition of $Fe_2S_3.H_2O$ rather than its smooth oxidation to active α-$Fe_2O_3.H_2O$, (2) the removal of hydrogen sulphide

* Paper to the Southern Association of Gas Engineers and Managers (Eastern District) Mar. 30, 1948.

from gas is incomplete, and (3) the rate of reaction between hydrogen sulphide and oxide is reduced.

It appears that the precise conditions of PH at which these three undesirable effects become noticeable are somewhat different. In particular, as experience in works practice shows, oxide may be quite appreciably acid without incomplete removal of hydrogen sulphide becoming serious. But there is no reason to suppose that under such conditions the reduction in rate of reaction, or the decomposition of $Fe_3S_3.H_2O$ into the inert and acid-forming FeS_2 and Fe_3S_9, are not appreciable and deleterious in their effect.

bog ores contain as much as 70% of iron oxide on a dry basis. Bog ore is often sold as containing not less than 25% of total iron expressed as Fe_2O_3, and not more than 50% of moisture. The Dutch bog ores are the most sought after; they are plentiful and of good quality. Bog ore is found also in Belgium, Finland, and Ireland.

The iron oxide in bog ore is present in several forms, namely α-$Fe_2O_3.H_2O$ together with γ-$Fe_2O_3.H_2O$ and amorphous oxide. Since both α- and γ-$Fe_2O_3.H_2O$ are very reactive towards hydrogen sulphide, the material is immediately active in the purifiers, and on prolonged use under the correct conditions the cycle of sulphiding and

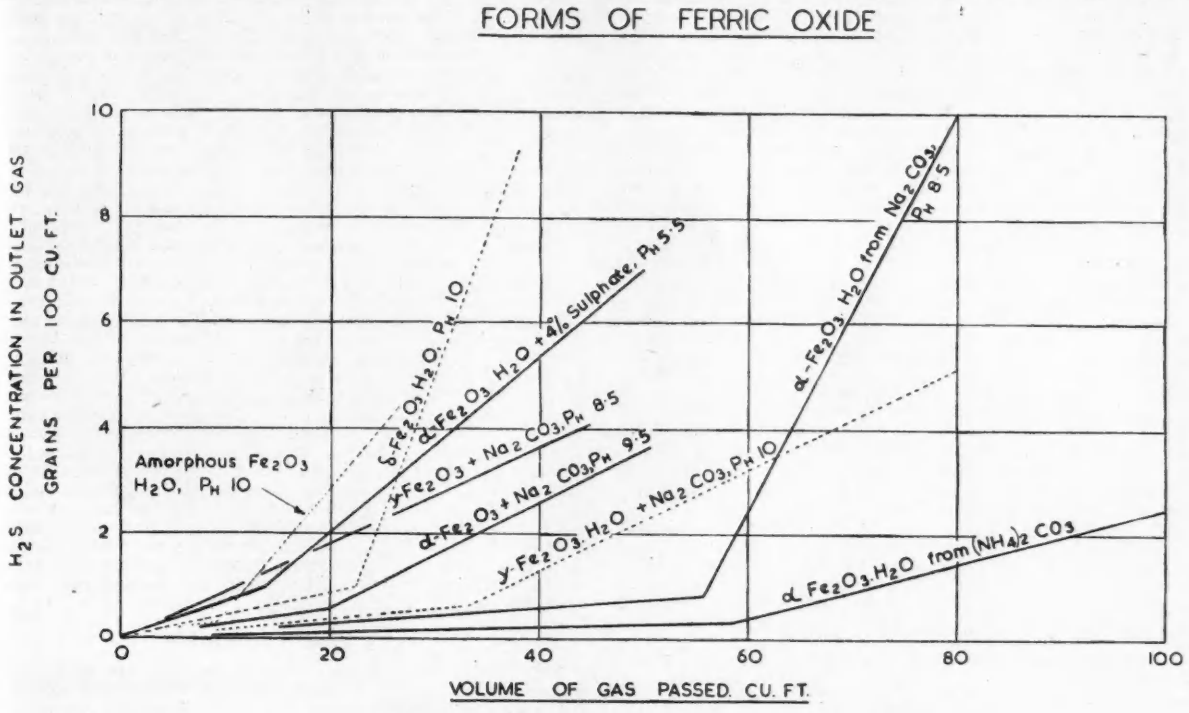


FIGURE 1. TUBE TESTS AT 10 CU. FT. PER HOUR

The rate of reaction between hydrogen sulphide and iron oxide is dependent upon the porosity of the sample. From the known molecular volumes it can be calculated that a tablet with a volume porosity of 50% would be converted into a mass almost devoid of porosity on complete change to the hydrated sulphide. In this connexion it is necessary to distinguish between the intrinsic porosity of the oxide, and the voids between the particles which constitute the open texture of a charge of material in a box. This open texture allows drainage of water, whereas it is the pores in the ferric oxide structure which are of importance in the reaction with hydrogen sulphide. The inferior behaviour of the anhydrous forms of iron oxide is due not only to the induction period in their reaction with hydrogen sulphide, but also to the difficulty of preparing them in a sufficiently porous state.

The Materials Used in Purifiers

The iron oxide material first used for hydrogen sulphide removal, and called after Laming, was prepared by mixing ferrous sulphate, slaked lime, clay and water, and was a successful choice. The product of the reaction of ferrous sulphate and calcium hydroxide is ferrous hydroxide which oxidizes in air to α-$Fe_2O_3.H_2O$, the most valuable form of iron oxide for the removal of hydrogen sulphide.

The use of a solid material for gas purification has, however, many disadvantages, one of which is the loss of gas pressure. In order to avoid unduly high gas pressures at the inlet of the purifiers, and to reduce the cost of pumping, it is necessary to use material of sufficiently open texture. This was realized by Hills, who made an open material by mixing the oxide with sawdust and other substances to give a coarse powder. The preparation of suitable purification material by the laborious mixing of such constituents was a disadvantage which left the way open to the introduction of bog ore.

As dug, bog ore often contains a high proportion of water, which is usually reduced to below 50% before delivery. Further air drying, preferably under cover and during the summer, is necessary to give a satisfactory texture, the moisture content being reduced to about 30%, depending on the relative amounts of fibre and clay in the sample. As a guide, the moisture content should be such that the material when squeezed in the hand just conglomerates without becoming sticky or exuding water. The total iron content expressed as Fe_2O_3 should be 50% or more on a moisture-free basis; the richest oxidation due to the system of rotation converts the less active forms into α-$Fe_2O_3.H_2O$. Bog ore is however usually acidic, some forms more so than others, and a charge of new bog ore should not be used until it has been made neutral or slightly alkaline.

Hydrated ferric oxide occurs naturally in several forms. Goethite consists of α-$Fe_2O_3.H_2O$, but it is useless for the removal of hydrogen sulphide from gas because it is very dense and has an exceedingly low porosity, so that only the surface reacts. Limonite occurs in several forms, and consists of α-$Fe_2O_3.H_2O$, but with the exception of bog ore, which may be classed as an impure limonite, the varieties are not suitable for purification because of their low porosity. For example, the porosity of yellow ochre is generally only 20%; and a sample of weathered ironstone was found to have a porosity of 31%. These figures are very low for new oxide.

Large amounts of iron oxide are obtained as a by-product in the manufacture of aluminium. The ore used is bauxite, amorphous $Al_2O_3.3H_2O$, but since this contains iron its is purified before electrolysis. The purification process employed in Germany was that of Deville-Péchiney, in which the bauxite is fused with sodium carbonate and lixiviated with water, when the sodium ferrite in the melt is decomposed with precipitation of α-$Fe_2O_3.H_2O$. This iron oxide was widely used in Germany and elsewhere as a very active purification material under the name of "Lux." Many firms in the aluminium industry, however, use the Baeyer process in which the bauxite is digested with caustic soda solution under pressure, when the iron oxide remains undissolved as α-Fe_2O_3, which is of little value for gas purification. Lux contains excess alkali, and contains traces of magnetic γ-Fe_2O_3 from the oxidation of Fe_3O_4 which is formed by the reducing of organic matter during the fusion; it also contains alumina and titanium oxide as inert diluents. Lux is a very valuable form of iron oxide for the purification of gas, when suitably mixed with other material so as to avoid the difficulties which would otherwise result from its state of fine division.

Iron oxide is also obtained by the corrosion of scrap iron or steel. It is formed as γ-Fe_2O_3, a strongly magnetic brown oxide, and has little value for gas purification.

Considerable quantities of iron salts are obtained in the metal pickling industry. Ferrous sulphate is the product when sulphuric acid is used, and treatment of the solution with slaked lime yields a

precipitate of ferrous hydroxide and calcium sulphate, which after filtration and oxidation in the air is converted to α-$Fe_2O_3.H_2O$ and $CaSO_4.2H_2O$. The waste pickle liquor is more usually evaporated for recovery of sulphuric acid, when crystals of $FeSO_4.7H_2O$, known commercially as copperas, are obtained. Copperas is a convenient source of iron oxide for purification, for on neutralizing with alkali (sodium carbonate, slaked lime or chalk) and exposing to the air, it is converted to α-$Fe_2O_3.H_2O$. Precipitated iron oxide can be obtained as a by-product in other industrial processes, and in fact the preparation of special purifying materials by such methods has been practised for many years, but it is generally too expensive for standard use. The real value of these artificial precipitated oxides lies in their addition to material of poor quality in order to increase the activity.

An obvious economy would be to use again the iron oxide from spent oxide, but unfortunately the main commercial method of treating spent oxide does not regenerate a satisfactory purification material. By far the bulk of the spent oxide from gas-works is sold to sulphuric acid manufacturers; it is burned to yield sulphur dioxide, which is then treated in the chamber process. This burning has the advantage of destroying tarry matter, but it has the disadvantage of forming anhydrous α-Fe_2O_3. This would not be an insuperable difficulty in itself, for α-Fe_2O_3, although reacting very slowly with hydrogen sulphide, does gradually form the sulphide, and this on oxidation is converted to α-$Fe_2O_3.H_2O$, so that the burnt oxide can be brought slowly into use if suitably mixed with active material to prevent high slips at the start. The chief objection to burnt oxide is the sintering resulting from high temperatures in the burners, as G. Weyman (4) pointed out, while Griffith and Morcom have shown the effect of temperature on the reactivity of α-Fe_2O_3. Moreover, the burnt oxide is in a very objectionable state of extremely fine division, as everyone who has watched men discharging a dry charge containing a high proportion of burnt oxide will agree.

Another method of treating spent oxide is to extract the sulphur. This is carried out commercially using carbon disulphide, a solvent of high capacity, but toxic and inflammable. Tar is dissolved at the same time, but not cyanogen compounds, which can however be removed by leaching with alkali solution. Oxide so extracted is suitable for re-use in the purifiers.

Reference has been made to the use of peat in purification mixtures in order to improve the texture of the mass. More has been claimed for it than this. M. P. Appleby and J. Hughes (5) stated that experiments with peat as a carrier for iron oxide unexpectedly gave a greater purification effect than could be attributed to mechanical properties. They showed that up to 70% of sulphur could be accumulated without any iron oxide at all, so that peat alone is a purifying agent, a property ascribed to the presence of sulphur bacteria. J. Quarendon (6) reported on the bacterial removal of hydrogen sulphide from water gas and coal gas by peat and peat-oxide mixtures. Peat tailings consisting of 43% of $\frac{1}{4}$ to $\frac{1}{2}$ in. and 44% $\frac{1}{8}$ to $\frac{1}{4}$ in., were disintegrated from the bale and moistened to 60% of water, when the bulk density was 9 lb. per cu.ft. Peat alone was not very satisfactory, but mixtures with an equal volume of oxide gave good results.

There are indeed obvious advantages in mixing peat with oxide. It may be that sterilized peat would act in a similar way. The drainage is improved, gas flow facilitated, tolerance to moisture widened, sensitivity to temperature changes decreased, and caking is reduced. And it is true that the mixture can be worked up to as high a sulphur content, expressed as per cent. by weight, as oxide alone. But one consideration appears to be sometimes overlooked. A purifier box contains a certain volume of material, and if that material has a bulk density of one-half that of a normal charge, then the same sulphur content as a percentage by weight means one-half as much sulphur removed. This means in practice twice as frequent changing of charges.

Highly Active Material Used in Special Purifiers

A recent development in the preparation of purification materials is the formation of shaped bodies of highly active character. In the normal process of iron oxide purification the mass used in the box consists of particles ranging in size from fine dust to coarse lumps, depending on the nature of the crusher or disintegrator used, and the kind of material. For example, a size analysis of part-spent bog ore charged into a box after passage through a disintegrator was as follows: above 0.1 in., 23%; 0.1-0.05 in., 22%; 0.05-0.025 in., 31%; 0.025-0.01 in., 17%; and below 0.01 in., 7%. The irregularity in the size of the pieces gives rise to irregular flow of gas through the oxide layer, and the small size of much of the material offers a high resistance to the passage of gas. As a result, the velocity of flow of the gas has to be kept low, and a large plant is required. It is common practice to employ a linear gas velocity of 1.4 ft. per minute calculated on the empty box, and to pass the gas through 16 ft. total bed of oxide. This corresponds to 5.25 space volumes per hour.

Various proposals have been made to overcome these objections by employing iron oxide in the form of cakes or other shaped bodies. The I.G. Farbenindustrie proposed the use of bodies made by mixing reactive hydrated iron oxide with a hydraulic binding agent in the presence of an alkali metal bicarbonate and a little water, and then heating the mixture (7). Gastechnik, of Oberhausen, prepared moulded bodies by mixing hydrated iron oxide (Lux) or bog ore with cement, alkali and wood shavings, cutting the tough mass into cubes, and then rolling the bodies in a drum, followed by drying (8). This process was developed by Raffloer, and is described by A. Thau (9). Further proposals of a like nature were made by G. E. Seil, Gastechnik, M. F. Bertrand, E. Urbain, and I.G. (10). A description of the process of manufacturing moulded iron oxide balls is given in the *Gas World* (11).

A simpler method of preparing iron oxide balls of high activity has been developed (12). Ferrous sulphate crystals (commercial copperas free from excess moisture) are mixed with one-third their weight of slaked lime and rolled in an inclined drum, while sprinkling with a little water to initiate the following reaction:

$$FeSO_4.7H_2O + Ca(OH)_2 = Fe(OH)_2 + CaSO_4.2H_2O + 5H_2O$$

This is followed by atmospheric oxidation of the ferrous hydroxide to α-$Fe_2O_3.H_2O$. The calcium sulphate acts as a binding agent and gives a firm product, which is graded between $\frac{1}{16}$ and $\frac{3}{8}$ in. in diamater.

These spheres or nodules were used in a pilot plant to purify coal gas at the rate of 4,000 cu.ft. per hour, the material being contained in two towers in series each of 2 ft. diameter, giving a total depth of bed of 17 ft. These conditions correspond to 74 space volumes per hour, or 14 times that employed in ordinary purifiers. The bodies were passed downwards through the towers, countercurrent to the gas the rate necessary to maintain the required purity of the outlet gas. When treating gas containing 335 grains of hydrogen sulphide per 100 cu.ft., and reducing the outlet concentration to 0.6 parts per million, the material discharged from the towers contained 20% of sulphur. The sulphur content of the discharged material is lower than is customary in oxide purification, where rotation of the boxes has a beneficial effect; and it is doubtful whether a figure above 30% can be reached by successive foulings (that is, re-use in the towers after exposure to air) at these high gas rates. The material lends itself well, however, to extraction of the sulphur by means of solvents, and the extracted nodules are of high reactivity; but it is only to be expected that accumulation of blue in the nodules would lead to a loss of activity, as with any form of used oxide from which sulphur is extracted. There is good reason to suppose that reduction in the gas rate from the high value of 14 times that used in ordinary boxes would lead to a considerably higher sulphur content of nodules when discharged.

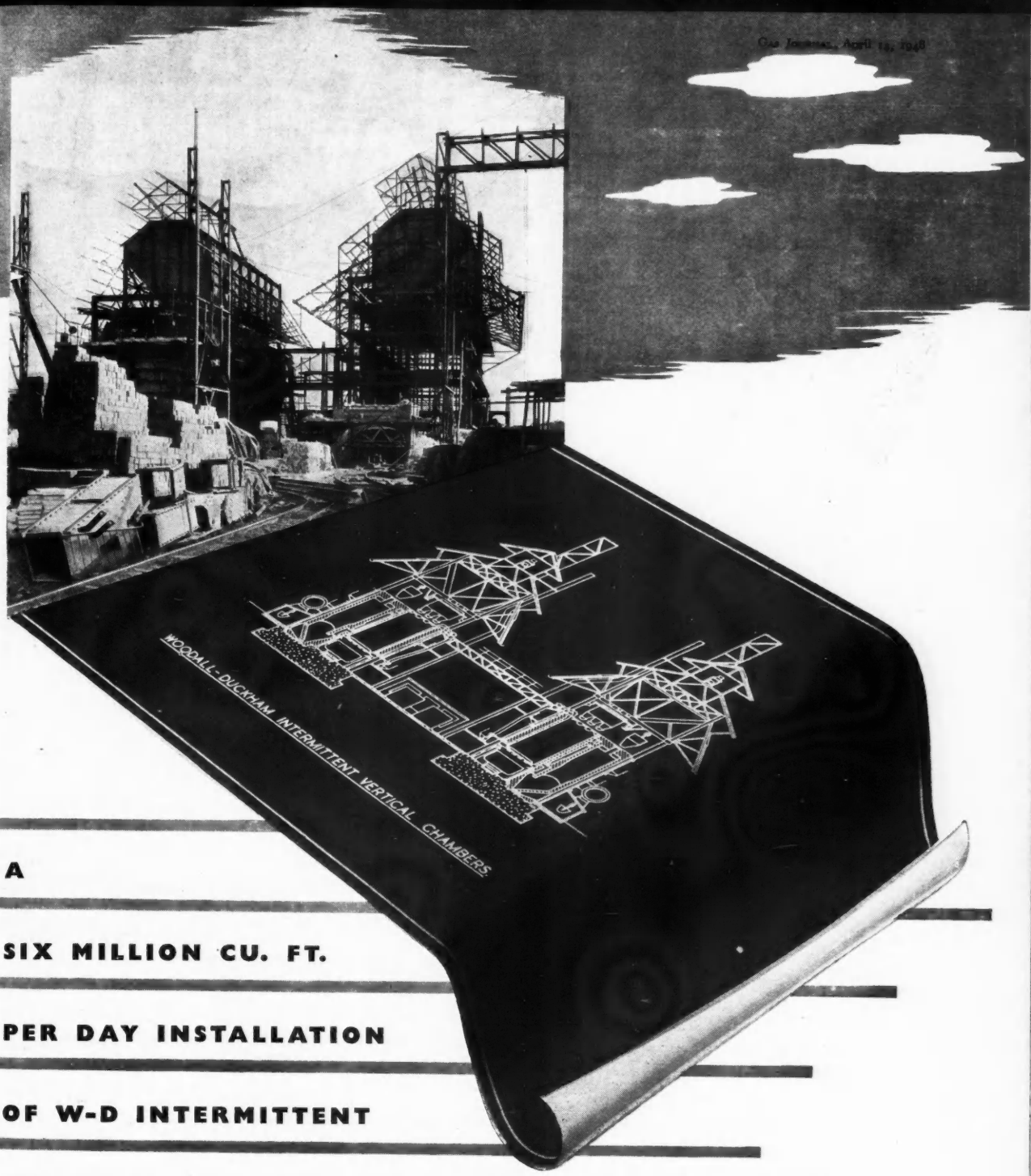
Material prepared by the nodulation of copperas and lime is more expensive than the forms of oxide used in ordinary purifiers, and it may not be considered economic to use the nodules at high gas rates for the purification of coal gas containing, say, 500 grains of hydrogen sulphide per 100 cu.ft. On the other hand, if a gas velocity two or three times that employed in ordinary boxes enables the nodules to be fouled to a very high sulphur content, the position may need re-examining.

Peak Load Purification

The nodules prepared from copperas and lime are particularly suitable for peak load purification, when the relatively high cost of the material becomes less important than the advantages of a cheap, simple and compact plant, and they are also very suitable for removing small quantities of hydrogen sulphide from gas, for example, at the outlet of a catalytic plant for removal of organic sulphur from gas, when about 5 grains of hydrogen sulphide per 100 cu.ft. are present. Two trials have been made on gas containing 5 grains of hydrogen sulphide per 100 cu.ft.

In the first, an elevated concrete box of cross-sectional area 55 sq. ft. was erected at the Harrow Works of the Gas Light and Coke Company to treat a stream of horizontal retort gas which had passed through a catalytic plant for removal of organic sulphur compounds, followed by a washer-cooler in which sodium carbonate solution was circulated to remove sulphur dioxide. The box was filled with nodules to a depth of 4 ft. 3 in.; the charge occupied 234 cu.ft. and weighed 4½ tons. The mean gas rate was 40,000 cu.ft. per hour, corresponding to 171 space volumes per hour, which is very high (32.6 times that commonly used in ordinary box purification). It had in fact been intended to install two such boxes in series, but the scheme was reduced because of the war. The box purified successfully 58 million cu.ft. of gas during a period of 61 days, and when the box was emptied the charge was found to have a mean sulphur content of 5.4%, equivalent to 6.6 grains of hydrogen sulphide per 100 cu.ft. of inlet gas. The low sulphur content of 5.4% is not disappointing in view of the very high gas velocity and the fact that the box had to be emptied as a single batch. Even if the nodules cost £20 per ton (a figure depending on the scale of manufacture) and are considered to be valueless at 5.4% of sulphur, the charge for the material is still only 0.075d. per therm. In any future plant it is proposed to provide rather more purification capacity, and, what is more important, to use a tower so as to obtain the advantage of counter-current movement of the nodules. It was found at Harrow that the nodules at the gas inlet end of the box contained 18.4% of sulphur, so that it is reasonable to expect that with a tower purifier of a size to give a gas rate of, say, 80 space volumes per hour, and with gravity discharge of nodules at the rate required to effect purification, the nodules can be fouled to about 20% of sulphur, in which case the cost of the material may well be less than 0.02d. per therm. The advantages of a simple compact plant and low labour requirements are obvious, and if the spent nodules could be extracted with a solvent and re-used the process would be very cheap.

The second test was made at Fulham on a pilot plant, using a mixture of unpurified and purified coal gas in the proportions of roughly 1 to 100 so as to obtain a concentration of about 5 grains of hydrogen



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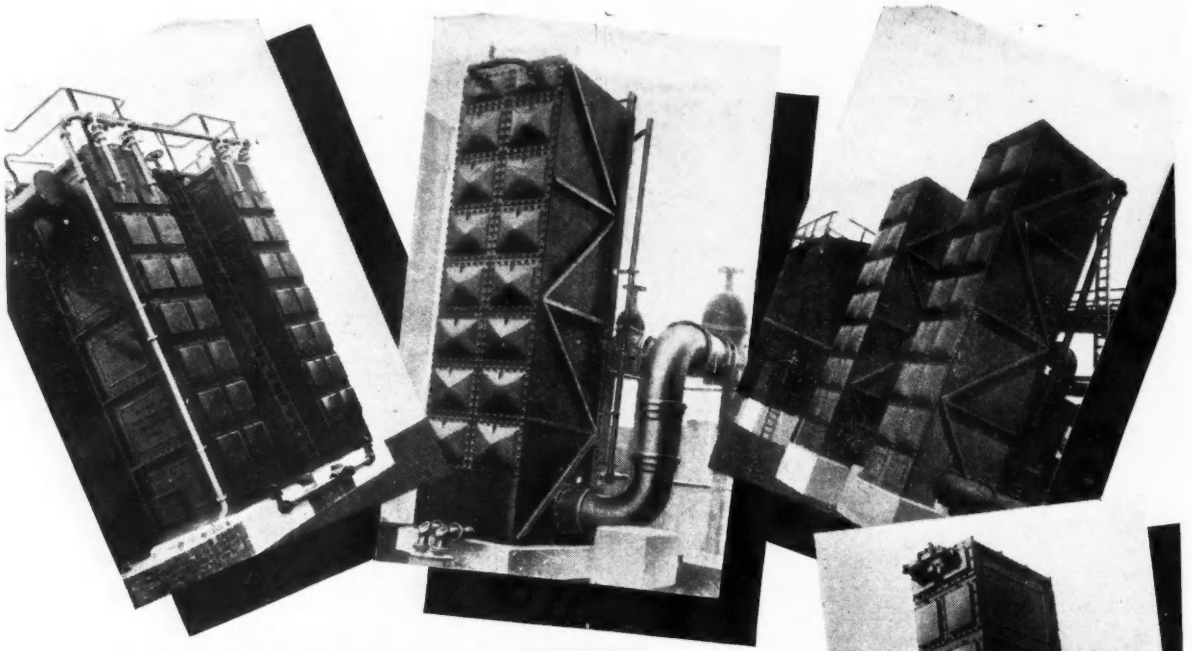

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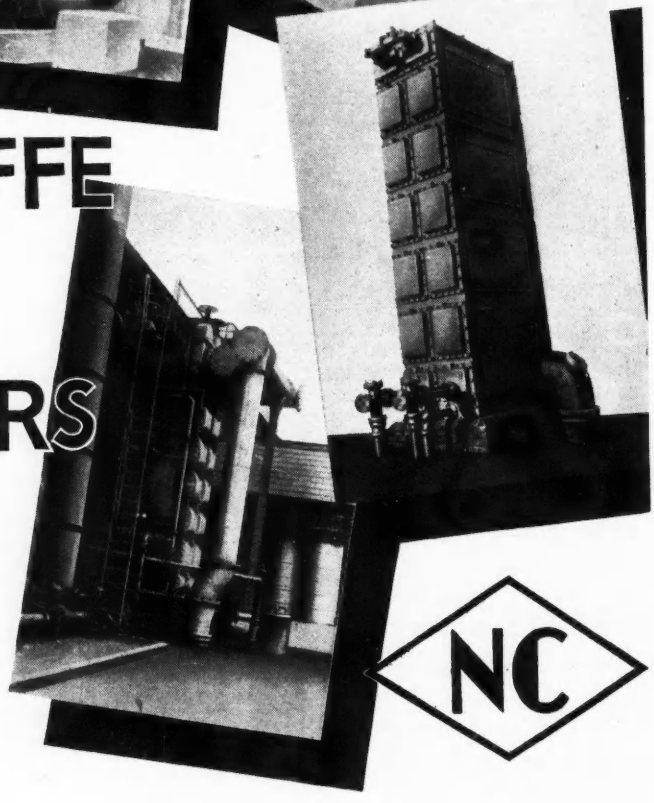

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sulphide per 100 cu.ft. The material tested consisted of tablets ⅜ in. in diameter made from Lux by pressure alone in a commercial tabletting machine. The tablets were charged into one tower 2 ft. in diameter to a depth of 8 ft. 6 in., the charge occupying 26.5 cu.ft. and weighing 1,500 lb. The gas rate was 4,000 cu.ft. per hour, corresponding to 151 space volumes per hour, which again is very high. The volume of gas passed through this charge up to Jan. 30 was 18.8 million cu.ft., and the concentration of hydrogen sulphide in the outlet gas at that date was less than 0.01 part per million. The mean hydrogen sulphide content of the inlet gas was 5 grains per 100 cu.ft., corresponding to a mean sulphur content in the tablets of 8.2%. It is intended to continue this test and to pass tablets downwards through the tower countercurrent to the gas flow at a rate sufficient to maintain the concentration of hydrogen sulphide in the outlet gas below the value aimed at in normal works practice, and to determine the sulphur content of the tablets discharged.

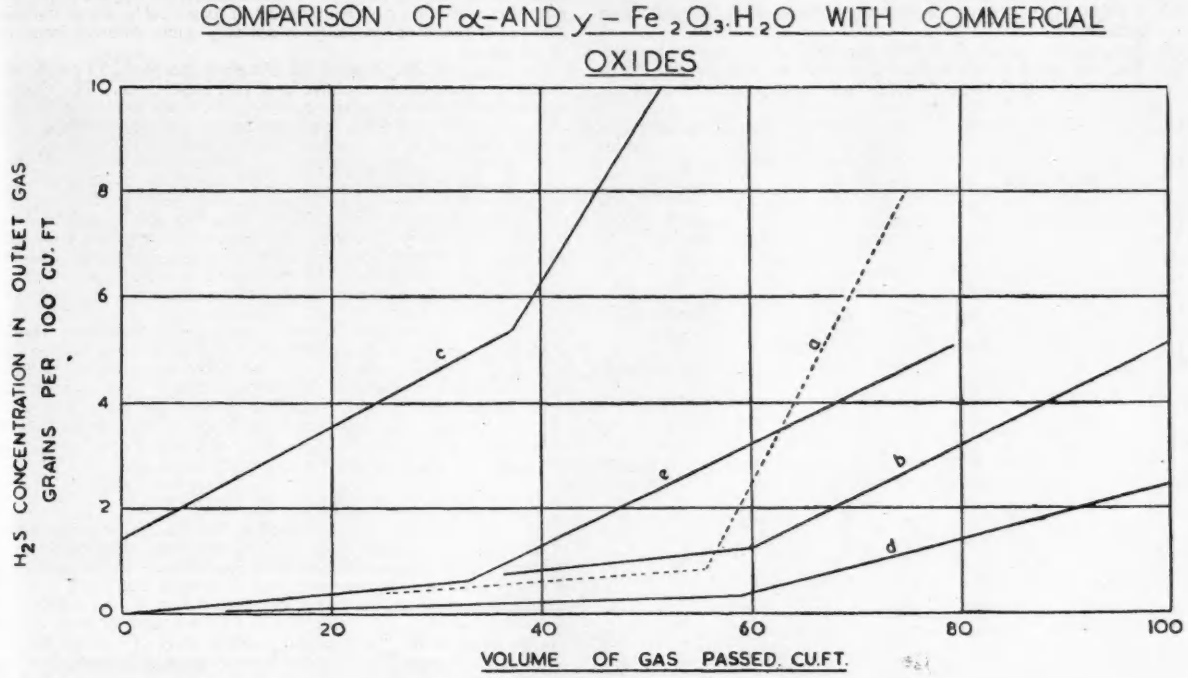


FIGURE 2. TUBE TESTS AT 10 CU.FT. PER HOUR.

The high activity of these special granular materials, which permits the use of a small plant in comparison with ordinary iron oxide masses, must be maintained by proper treatment of the gas. Tar fog and liquid droplets must be removed before the gas enters the purifiers; condensation of water in the purifiers must be avoided; and the PH of the material must not be allowed to fall below 7. Condensation of water in the purifiers results in a decrease in active surface and a marked reduction in activity. It is most to be guarded against in cold weather, especially when gas containing only small amounts of hydrogen sulphide is being treated, for in that case the heat evolved by the reaction is slight. It is then necessary to heat the gas entering the purifiers and to provide some form of heat insulation of the vessels.

The Evaluation of Purification Material

A. F. Kunberger (13) described a fouling test for oxide which has formed the basis of methods of determining the "available" iron oxide or the "capacity" of the material. The method is described by G. Weyman (4). A sample of the oxide is treated with hydrogen sulphide until no further absorption occurs, any water leaving the fouling tube being trapped in a calcium chloride tube. The increase in weight of the two tubes together gives the weight of hydrogen sulphide absorbed, and the available oxide is calculated from the equation

$$Fe_2O_3 + 3H_2S = Fe_2S_3 + 3H_2O$$

A modification of this method consists in fouling the oxide with hydrogen sulphide, and then revivifying the sample in the air and determining the sulphur present (which may be done by extracting with carbon disulphide, or by the Boot and Ward method (14) of digesting with sodium sulphite and determining iodometrically the thiosulphate formed).

The capacity so determined gives no information as to the rate at which hydrogen sulphide and oxide react. The "activity" of oxide has been measured in several ways. W. A. Dunkley and R. D. Leitch (15) measured the maximum rate at which an inert gas containing a low concentration of hydrogen sulphide could be passed through a unit weight of the material with "complete removal" of hydrogen sulphide. D. V. Reid (16) passed coal gas containing hydrogen sulphide through a unit weight of material of standard grain size, and measured the hydrogen sulphide content of the outlet gas. This test simulates works conditions in that the hydrogen sulphide content of the inlet gas can be made similar to that in works practice, but it does not allow for the changes which occur when sulphiding and oxidation proceed in a cyclic process, changes which, as described earlier, have a profound effect on the nature of the iron oxide.

In contrast to these streaming methods of measuring activity K. Bunte, H. Brückner and A. Lenze (17) developed a static method in which the rate of absorption of hydrogen sulphide by the iron oxide, and the rate of absorption of oxygen by the iron sulphide so formed, were measured by observing the rate of change of pressure when the sample was treated with the gas in a closed vessel. This test bears very little relation to works practice, but it does show which material reacts readily with hydrogen sulphide. If the fouling reaction is allowed to proceed to completion, it also gives a value for the capacity of the oxide.

The relative importance of the results of tests for capacity, activity, and absorption and revivification, is uncertain. In view of the fact that, owing to the rotation of boxes, the material in practice takes up only 1% or so of sulphur before being substantially revivified as last taker, it has even been suggested that it is not important that a material should have a high content of iron oxide, the iron oxide present being used over and over again at each rotation. But where is the sulphur deposited? Griffith and Morcom showed that considerable expansion must occur when the hydrated sulphide is formed from the oxide, from which it follows that closing of the pores must take place. On oxidation the sulphur is liberated on the surface, and it is reasonable to suppose that the activity of the oxide is accordingly diminished. In fact Griffith and Morcom found that a specimen of oxide which had been converted fully into sulphide and then allowed to oxidize reacted very slowly with hydrogen sulphide. However, H. B. Avery (18) found in experiments with iron oxide spread in a uniform film, and pure hydrogen sulphide, that the capacity after 10 processes of sulphiding followed by oxidation was identical with the capacity on the first sulphiding. He obtained evidence from microscopic study that the sulphur was present under the surface of the iron oxide, and he considered that the migration of the iron to the surface of the particle explains the continued capacity of a carefully prepared oxide. In contrast to this finding, Griffith and Hopton showed that tablets of pure α-$Fe_2O_3.H_2O$ fouled with district gas containing 1% of hydrogen sulphide and 1.2% of oxygen had a high activity when new; but that when the fouled tablets were oxidized below 27° C. and then re-tested, the activity fell appreciably. The distinction between activity and capacity may be important in this connexion.

The test for activity recommended by Griffith and Hopton consists in preparing the sample to pass 18-mesh and stay on 60-mesh sieve,

with a free water content of 10 to 12%, and a PH of 7.5 to 8.5. The sample is then compressed in a tabletting machine to form tablets ⅜ in. in diameter, with convex ends, and a maximum thickness of $\frac{1}{16}$ in. The tablets are packed into a glass tube of 1¼ in. internal diameter to a depth of 12 in., and coal gas containing 500 grains of hydrogen sulphide per 100 cu.ft. and 1.2% of oxygen is passed through at a standard rate. The concentration of hydrogen sulphide in the outlet gas is determined at frequent intervals by a lead acetate disc test, or, for the higher amounts, by ammoniacal zinc sulphate.

Some results at 10 cu.ft. per hour are shown graphically in Fig. 2, the samples tested being as follows:

(*a*) α-$Fe_2O_3.H_2O$, a fairly pure form obtained as a by-product in industry.
(*b*) Lux, that is, α-$Fe_2O_3.H_2O$ from hydrolysis of ferrite from bauxite.
(*c*) Bog ore treated with sodium carbonate to increase the PH to 8.5 (the original sample of PH 6.0 gave a very high slip from the start).
(*d*) α-$Fe_2O_3.H_2O$ prepared in the laboratory from ammonium carbonate (see Fig. 1).
(*e*) γ-$Fe_2O_3.H_2O$ prepared in the laboratory (see Fig. 1).

Many commercial iron oxide materials used or offered for gas purification have a low activity compared with α-$Fe_2O_3.H_2O$, and it is then advisable to reduce the gas rate in the test to 5 cu.ft. per hour. The results of tests under these conditions are shown in Fig. 3 for the following samples:

(*a*) Weathered ironstone.
(*b*) Siliceous iron oxide ore.
(*c*) Artificial oxide mixture containing burnt oxide, α-$Fe_2O_3.H_2O$, sawdust or peat.
(*d*) Another sample of artificial oxide mixture.
(*e*) Material obtained by reacting ferrous sulphate solution with slaked lime and filtering.
(*f*) Lux.
(*g*) α-$Fe_2O_3.H_2O$ obtained as a by-product in a fairly pure form.
(*h*) and (*i*) Samples of bog ore from different parts of Holland.

As a matter of interest the behaviour of nodules prepared from copperas and lime as described previously has been included on the graph, as curve *k*.

The "break point" at which the concentration of hydrogen sulphide suddenly increases, the outlet concentration at the break point, and the slope of the curve after the break point, are given in Tables 1 and 2 together with other important properties of the samples.

TABLE 1.—*Tube Tests at 5 cu.ft. per Hour*

Sample	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)
Moisture of sample % ...	2.3	11.1	8.8	8.2	8.1
PH	8.0	8.0	8.0	7.0	8.0
Total Fe_2O_3, % moisture-free basis ...	83.1	50.3	39.6	48.7	31.5
% of total Fe_2O_3 soluble in 4% HCl	1.3	4.0	12.2	7.8	31.4
Volume porosity of tablets, %	31.1	32.7	47.0	42.3	41.0
Bulk density of tablets, kg. per litre	1.34	1.30	0.63	0.73	0.88
Break point, minutes ...	0	40	0	160	650
Outlet concentration at break point, grs. per 100 cu.ft.	35	20	35	20	20
Slope after break point, grs. per 100 cu.ft. in 1 hour	175	250	25	11	38

TABLE 2.—*Tube Tests at 5 cu.ft. per Hour*

Sample	(*f*)	(*g*)	(*h*)	(*i*)	(*k*)
Moisture of sample, %...	10.2	12.0	10.1	9.5	14.5
PH	9.5	8.0	9.5	8.0	8.0
Total Fe_2O_3, % moisture-free basis ...	60.2	49.6	48.1	43.4	32.2
% of total Fe_2O_3 soluble in 4% HCl	75.1	83.8	35.8	16.8	68.7
Volume porosity of tablets, %	60.0	80.1	51.0	49.8	58.1
Bulk density of tablets, kg. per litre	0.90	0.68	0.89	0.97	0.66
Break point, minutes ...	740	1,130	850*	780*	980*
Outlet concentration at break point, grs. per 100 cu.ft.	0.6	0.24	36	20	15
Slope after break point, grs. per 100 cu.ft. in 1 hour	2.7	0.24	10	11	13

* Second break point.

These tests show the importance of the state of the iron oxide. The weathered ironstone (*a*), for example, contains more total Fe_2O_3 than any other sample studied, but the iron oxide is very dense and has a low porosity; it is also very little soluble in dilute hydrochloric acid. The performance of this sample is the poorest of all. The siliceous iron oxide (*b*) contains an average amount of total Fe_2O_3, but the material is also dense and of low porosity, and little soluble in dilute hydrochloric acid; its performance is very poor. One of the samples of artificial oxide mixture (*c*) has a low content of iron oxide and has a poor performance; but the other (*d*) has an average amount of Fe_2O_3, not however very soluble in dilute hydrochloric acid, and not of high porosity. The performance of this second sample is considerably better than that of the three bad samples, but is still inferior to that of bog ore or the various preparations of α-$Fe_2O_3.H_2O$. The performance of the mixture of α-$Fe_2O_3.H_2O$ and calcium sulphate obtained as a filter-cake from the addition of lime to ferrous sulphate solution (*e*) is good in view of the low content of Fe_2O_3, and the rather low porosity. Lux (*f*), which is a commercial form of α-$Fe_2O_3.H_2O$, is well known as a valuable material in gas purification, and this is borne out by the tests. The Fe_2O_3 content is high, and the large proportion of the iron oxide is soluble in dilute hydrochloric acid, while the volume porosity is high. Another commercial sample of α-$Fe_2O_3.H_2O$ (*g*) has a smaller content of Fe_2O_3, which however is very soluble in dilute hydrochloric acid and is highly porous. Both these commercial forms of α-$Fe_2O_3.H_2O$ are distinguished in the tube test by a very high degree of removal of hydrogen sulphide at the start, and good performance throughout the test. The two samples of bog ore (*h* and *i*) do not differ very widely in their content of total Fe_2O_3, nor in porosity. The performance of sample (*i*) is not very much different from that of sample (*h*).

It is suggested that examination of material proposed for purification by the methods outlined above is of real importance. The chemist, whose duty it is to give advice on the nature of the oxide and its value as a purification material, was unfortunately for long ignorant of the precise character of the reaction between hydrogen sulphide and the various forms of iron oxide. Now that more knowledge of these matters is at our disposal, every effort should be made to combine scientific examination with works experience. Where facilities exist for making tablets of the oxide sample, the determination of the porosity, and the behaviour on fouling in a stream of gas containing 500 grains of hydrogen sulphide, are of great assistance in evaluating oxide for use in the purifiers. Where such facilities do not exist, the determination of the content of total ferric oxide, and the proportion soluble in dilute hydrochloric acid, together with the measurement of the capacity as determined by the amount of pure hydrogen sulphide absorbed at saturation, and of the activity by a streaming method such as that of Reid (16), serve as a basis for comparing the value of oxides. Account must also be taken of the physical nature of the material. All laboratory tests of this kind must be combined with observation of the behaviour of the oxide in works use. In this way, and in this way only, can experience be gained in the evaluation of oxides, and the choice of oxides placed on a scientific basis.

The Design of Purifiers

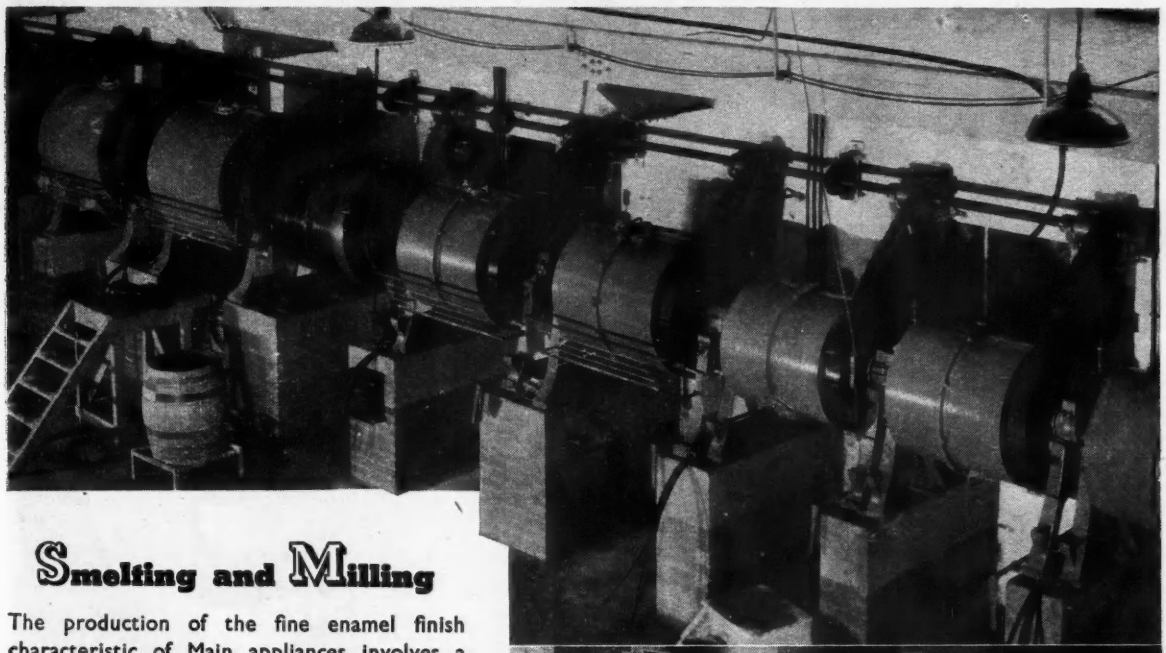
The design of plant is determined by the need for a large volume of oxide and a low gas velocity, and the provision of facilities for the handling of the oxide and the rotation of the boxes. As a result of long experience the usual British practice is to provide four boxes in series, each with a cross-sectional area of about 0.5 sq. ft. per 1,000 cu.ft. of coal gas per day, and each containing a total depth of oxide of 4 ft. For example, purifiers for treating 5 million cu.ft. of coal gas per day may consist of eight boxes arranged in two parallel streams, each box having internal dimensions of 36 ft. by 36 ft. and containing 4 ft. total bed of oxide. This rule has the disadvantage of not taking into consideration differences in the hydrogen sulphide content of the gas, yet it is well known that purifiers which are satisfactory when treating coal gas containing 500-700 grains of hydrogen sulphide per 100 cu.ft. give rise to anxiety when the hydrogen sulphide content rises to, say, 900 grains per 100 cu.ft. as the result of the use of high-sulphur coal in the retorts. G. W. Anderson (19) proposed a formula for the size of purifiers in which the volume of oxide required is proportional to the square root of the hydrogen sulphide content of the gas.

For the purification of water gas containing 150-200 grains of hydrogen sulphide per 100 cu.ft. it is permissible to reduce the cross-sectional area of the box, and a figure of 0.4 sq. ft. per 1,000 cu.ft. per day is suitable. This reduction is however unwise when carburetted water gas incompletely freed from tar fog is treated. Before the introduction of the electrostatic detarrer, the presence of appreciable quantities of tar fog in carburetted water gas reduced the activity of the iron oxide to such an extent that it was necessary to provide purifiers of the same size as those required for coal gas. With the high degree of tar removal now possible, some advantage may be taken of the lower content of hydrogen sulphide by reducing the area.

The dimensions suggested above for coal gas purifiers correspond to a gas rate of just over 20 cu.ft. per hour per cubic foot of oxide in each box. This figure is sometimes called the R ratio for the set. Under average conditions it may be agreed that 20 cu.ft. per hour does represent the normal gas rate which can be treated successfully per cubic foot of oxide in each box of a set of four; but circumstances vary considerably from works to works. There are works in this country which, by virtue of sound technical control and the use of highly active oxide, are able to purify successfully 50% more gas than the average, and indeed, not merely to purify successfully but to keep the oxygen content of the finished gas well below the normal. The advantages of such high purifier capacity and low inerts in gas are so great that the extra care required to achieve them is far more than repaid. The maintenance of suitable gas conditions at the inlet of the purifiers, especially freedom from tar; the choice of active material and its correct treatment, including thorough mixing, adequate aeration on discharging, attention to size and moisture content; strict supervision of the purifiers with as much control as possible over the working conditions, and frequent testing; all these features require equipment and attention, and they cost time and money. But in their absence oxide purification will be one long struggle to purify the gas to the statutory limit, and instead of being able to control adequately an important feature of gas manufacture, one will find oneself forced to

BEHIND THE SCENES

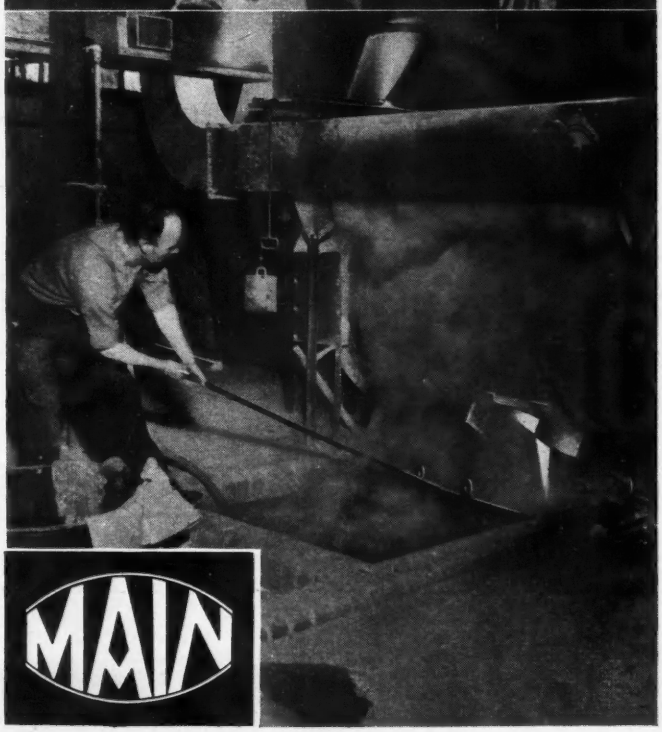
IN THE MANUFACTURE OF MODERN GAS APPLIANCES



Smelting and Milling

The production of the fine enamel finish characteristic of Main appliances involves a series of interesting operations. First, the powdered ingredients are weighed, carefully mixed together according to the type of enamel required, and put into the smelting retort. Here they are subjected to a temperature between 1,050° C. and 1,100° C. which reduces the powders to a molten mass. When this has reached the desired temperature and viscosity, the retort is revolved and the contents poured into a trough of water, which causes the "metal" to disintegrate and produce what is known as "frit." This is carefully dried, inspected and weighed and oxides are added according to the colour required. It is now ready for the "milling" process in rotary drums half filled with stone grinding balls. The "frit" is mixed with water and is ground for 8 to 10 hours until it is reduced to a smooth suspension of enamel ready for application to the various parts of gas appliances requiring this particular finish.

The upper illustration shows rotary grinding mills, the lower, white-hot "metal" being poured from the smelting retort.



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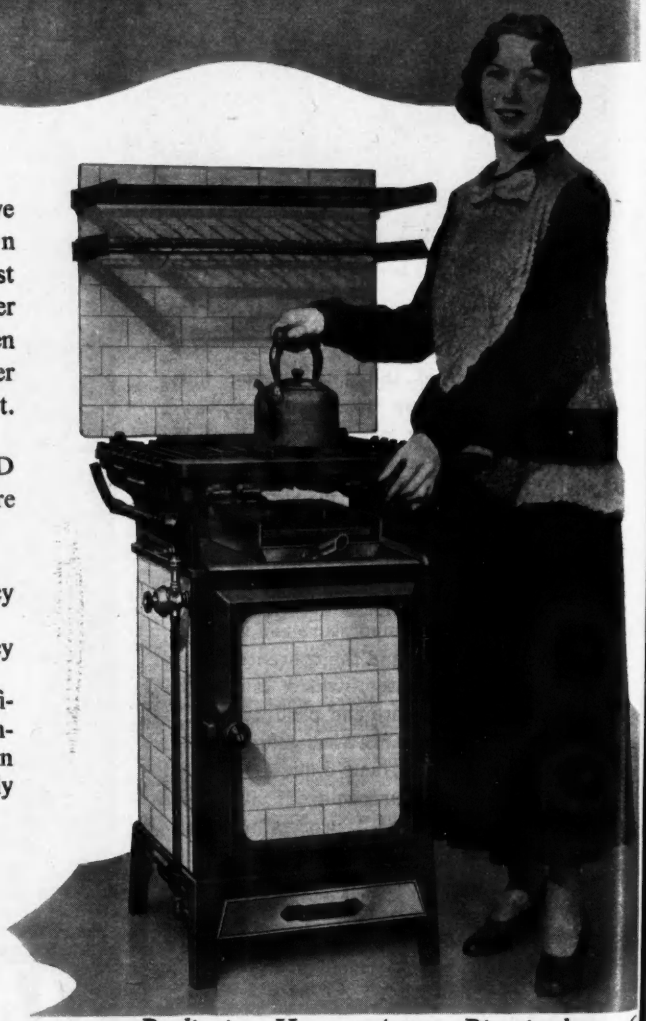

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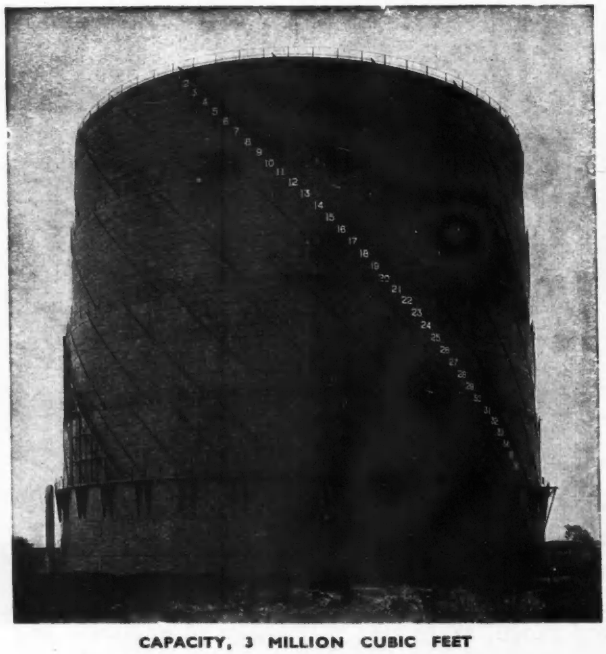

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adopt desperate short-term remedies dictated mercilessly by the inefficiency of the purifiers. The necessity for study of the oxide material has often been stressed; for example, J. A. Speers has recently discussed the influence of moisture content on the consolidation of oxide in the box. It may well be that more care in such matters would result in such improvement in oxide purification that many of the disadvantages, which are now so much complained of, would become of little account.

With a cross-sectional area of box corresponding to 0.5 sq. ft. per 1,000 cu.ft. per day, the linear gas velocity calculated on the charging the two layers. Whether such inequalities affect adversely the performance of split flow purifiers to such an extent as to be a serious handicap depends on conditions of working; and where oxide can be prepared in a uniform state, and effective control over tar fog and temperature is maintained, there are advocates of this system who can point to large installations in successful operation. The fouling of the oxide in tower purifiers, which operate with split flow through numerous trays of oxide, is claimed to be uniform.

At least it is certain with simple flow that all the gas is treated equally, subject always to the risk of channelling, which in any case

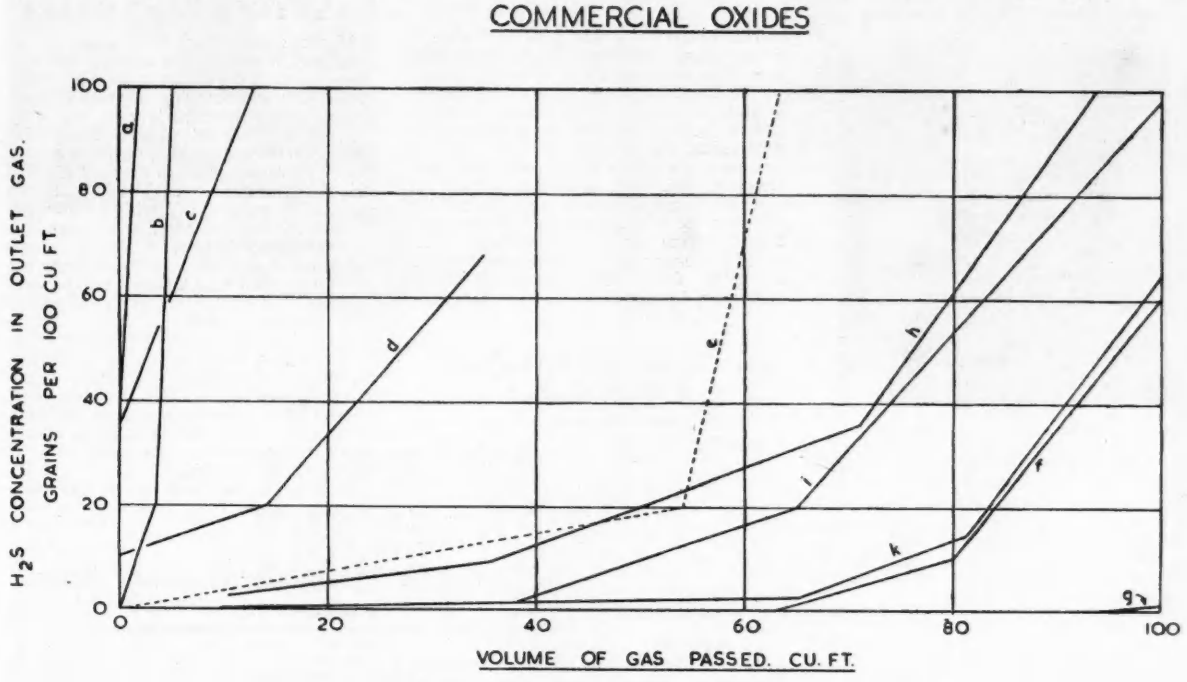


FIGURE 3. TUBE TESTS AT 5 CU.FT. PER HOUR

empty box is 1.4 ft. per minute, and low as this may seem, it is necessary in order to avoid high loss of pressure in the purifiers. The pressure drop at a given gas rate depends upon the size of the particles of oxide. Speers (20) stated that almost all the pressure drop in purifiers is due to the particles which pass a 1/40 in. sieve, and this observation is confirmed by the work of H. G. Pyke and H. F. Monaghan (21), who show also the effect of the moisture content of the oxide on the density, free space and back-pressure. They found for mixtures of oxide and sawdust containing 15% of moisture that

$$K = 3.14\, d^{-0.61}$$

where K is the pressure drop in inches W.G. per foot depth of oxide at a gas rate of 1 cu.ft. per minute per sq. ft. of box cross-section, and d is the mean size of the particles in thousandths of an inch. They found also that the pressure drop is directly proportional to the gas rate, a fact well established by several workers. Thus, according to this equation, the back-pressure of oxide of diameter 1/40 in. at a gas rate of 1.4 ft. per minute should be 0.61 in. W.G. per foot depth, or 10 in. for four boxes each containing 4 ft. of oxide. In actual fact a loss of pressure of 10 in. W.G. across the purifiers is normal in practice, but the figure is very variable, and sometimes increases so markedly that for this reason, rather than because the activity is too low, a box must be discharged. Every effort must be made to avoid untimely discharging for reasons of high back-pressure, by selection of mixtures and control of moisture, and by the absence of tar and naphthalene deposition. The manner of filling the box is of great importance.

In the above discussion it has been assumed that all the gas flows through the total depth of oxide in the boxes, a condition of working which may be called "simple" flow. It is possible to reduce the pressure drop very considerably by working in "split" flow, either inwards or outwards. The gas velocity is halved, and the depth of oxide traversed is also halved, so that the pressure drop across the purifiers is reduced to one-quarter of that at simple flow. This is a great advantage, against which must be set the difficulty of obtaining equal flow of gas through the two layers in the box. This difficulty is to be expected, for the gas meets the full upper surface of one layer, whereas it is introduced through the openings in the grids at the bottom of the other layer, so that deposition of moisture, and caking due to sulphur formation, have an unequal effect on the resistance to gas flow. There is also the danger of drainage from the upper layer on to the lower, and the possibility of different packing when is graver with split flow.

Another factor of importance in the design of purification plant is the provision for handling the oxide. It is not very common to succeed in fouling up to spent oxide in two exposures, and it is desirable not to exceed three because of high handling costs. For each exposure the material must be handled twice—namely, on charging and discharging. When it is fully spent it contains about 1 ton of oxide material per ton of sulphur, but at the earlier stages the mixture obviously contains a larger weight of oxide than of sulphur. It is found that between 6 and 8 tons of oxide are commonly moved for every ton of sulphur recovered from the gas. The heavy nature of this work makes it desirable to design the plant with the best possible facilities for handling the oxide; these facilities include mechanical equipment and floor space.

(*to be continued*)

References

(1) T. G. Pearson and P. L. Robinson, *J. Chem. Soc.*, 1928, 814.
(2) R. H. Griffith and A. R. Morcom, *J. Chem. Soc.*, 1945, 786.
(3) R. H. Griffith and G. U. Hopton, Inst. Gas Engineers, Publication No. 288/120, 1945.
(4) G. Weyman, "Modern Gas-Works Chemistry," Benn Bros., Ltd.
(5) M. P. Appleby and J. Hughes, *Chemical Age*, 1941, **45**, 80.
(6) J. Quarendon, *J.S.C.I.*, 1941, **60**, 267.
(7) British Patent 400,387.
(8) British Patent 406,495.
(9) A. Thau, *Colliery Guardian*, 1934, **148**, 151
(10) British Patents 429,321, 433,823, 462,934, 477,494, and 498,066.
(11) *Gas World*, 1943, **119**, 149.
(12) British Patent 567,231.
(13) A. F. Kunberger, *Ind. Eng. Chem.*, 1913, **5**, 580.
(14) H. L. G. Boot and A. M. Ward, *J.S.C.I.*, 1935, **54**, 116T.
(15) W. A. Dunkley and R. D. Leitch, *Gas Journal*, 1925, **171**, 443.
(16) D. V. Reid, *Gas World*, 1931, **95**, 291.
(17) K. Bunte, H. Brückner and A. Lenze, *Gas und Wasserfach*, 1936, **79**, 669 and 689.
(18) H. B. Avery, *Chemistry and Industry*, 1939, **17**, 171.
(19) G. W. Anderson, *Gas Journal*, 1933, **202**, 922; **203**, 51.
(20) Speers, *Gas Journal*, 1936, **214**, 172.
(21) H. G. Pyke and H. F. Monaghan, *Australian National Gas Bulletin*, Sept.-Oct., 1946, p. 27.

Hot Water and Homicide !

The Gas Industry and Ascot Gas Water Heaters, Ltd., are in a new film—shortly to be released—entitled "High Pavement" produced by the J. Arthur Rank Organization. The film has been adapted from the novel of the same name and presents an ingenious plot in which gas and an Ascot instantaneous water heater are the joint stars in company with the heroine, Miss Sally Ann Howes. Briefly, a wealthy lady

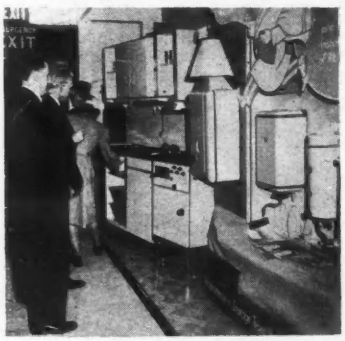
Sally Ann Howes and the silent witness

is found dead in her bedroom and her heiress finds herself suspected of murder. The Ascot pilot jet is a silent but potent witness that murder had been planned and death was not accidental. Further information with a copy of this photograph will be sent to gas undertakings in the towns where the film is to be shown.

* * *

Appliances at Edgware

Main gas appliances turned up in force at the "Norwest" Ideal Homes Appliances Exhibition at Edgware. On the Norwest Services stand main water heaters for every domestic purpose were to be seen. The types shown ranged from small instantaneous sink heaters and bath water heaters, to large multi-point and storage types. Main cookers, too, were on display, and the 57 Cabinet



The Mayor of Hendon, Councillor J. H. Rodway, inspects Main water heaters displayed at the "Norwest" Ideal Homes Appliances Exhibition at Edgware.

cooker was singled out for attention. A 177 built-in cooker was also shown as part of a "package" kitchen.

The high spot of the exhibition was the series of cooking sessions and lectures, held in the model kitchen, by the Television Cook, Philip Harben, who selected for his demonstrations the Main No. 177 (16 in. oven) cooker with four boiling burners and grill.

The exhibition was organized by Norwest Services, Ltd., and the opening address was given by the Mayor of Hendon, Councillor J. H. Rodway. Mr. Rodway himself has had considerable connexions with the gas industry, and in his address he spoke of the important contribution that well-designed and efficient domestic appliances are making to the economical use of the country's vital coal supplies.

* * *

The Board of Trade have published a revised *Raw Materials Guide* which sets out all the raw materials at present controlled by the Board and by the Ministry of Supply. It gives particulars of the relative statutory orders in force together with information concerning the various changes affecting raw materials which have taken place since October, 1946. Details are also given of the types of control at present operating and the addresses at which enquiries may be made. Copies of the Guide are obtainable, price 1s. 6d., through any bookseller or newsagent, or direct from H.M. Stationery Office, Kingsway, London, W.C.2, and branches.

GAS UNDERTAKINGS' RESULTS

Southport Gas Department.—In his budget statement on April 9, when Southport Town Council levied a rate of 14s. in the £, the highest in the history of the Borough, Alderman H. W. Barber, Chairman of the Finance Committee, said the estimated income of the Gas Department for 1947-48 was £461,174 against £425,016 for 1946-47—an increase of £36,158. The estimated expenditure of the undertaking for 1947-48 was £472,876 against £400,670 for 1946-47—an increase of £72,206. Increase in expenditure had exceeded the increase in income by no less than £36,048, due to the undertaking being required to honour various awards granting increases in wages, salaries, improved conditions of employment involving additional holidays with pay and reduction of the normal hours of the working week, and the increased cost of materials and coal. The result of the year's working was a gross loss of £11,702, to which were to be added loan charges £11,617, bank and deposit interest £1,100, and Schedule D income tax £5,200, making a total loss of £29,619 compared with a net profit in 1946-47 of £7,800.

Stirling Gas Light Company.—Forecast that nationalization of the gas industry will be followed by increased prices for gas and the loss of the personal touch between management and consumers was made by ex-Bailie James F. Millar, Chairman, at the annual meeting. He stated that, during the past year, the Company had achieved a record sale of gas, totalling 403 million cu.ft., and that, despite increased costs, their charges had remained unchanged. In September, however, a further increase of 4s. per ton on coal and 1d. per gall. on gas oil, together with an increase in October of railway carriage charges, had to be met, and, ultimately, the Directors decided that the pre-war price of gas would require to be increased by 0.8d. per therm as from January, 1948. Since that time, further increased costs had taken place, and, owing to the shortage of coal gas retort plant, it had become imperative that the production of carburetted water gas should continue in order to maintain supplies, thus involving the Company in considerable expense. This year they celebrated the 50th anniversary of the Company's Charter of Incorporation. It was a matter of great regret that local control, which had suited local conditions for 120 years, should now pass to a Government Department under the terms of the Nationalization Bill. The Company had no official quotation for its stock, so, in terms of the Bill, the take-over price would be a matter for future negotiation. On the financial side, therefore, he had no information whatever, and the shareholders could only leave it to the Board to make the best terms possible.

GAS STOCKS AND SHARES

Market conditions were very quiet in the early part of the week in anticipation of the Budget, and turnover was small in all departments, with prices moving only within narrow limits. Apart from the levy on investment income, Sir Stafford Cripp's first Budget appears to have met with a favourable reception. There was a sharp marking down of British Government securities in face of an increased amount of selling, prompted by the fear that gilt-edged stocks would be realized to meet the levy. On the other hand, industrial shares went up moderately with an average gain of 2.6 points on the week, against a fall of 0.51 points in the average level of British funds.

There was an increased turnover in gas stocks, with a daily average of 70 bargains on the London Stock Exchange, against about 55 per day in the preceding week. The increased demand was most noticeable in the section likely to be favourably affected by the compensation adjustments based on wartime circumstances.

The week's rises and falls in gas stocks were as follows:

OFFICIAL LIST

Associated G. & W., ord. ...	22/	— 24/	+ 6d.
Bournemouth, 4 p.c. pref.	96	—101	+ 1
British Gas Light, 5½ p.c. "B" cum. pref.	108	—113	+ 1
Colombo, Ltd., ord.	30/	— 35/	— 3s.
Imperial Continental, cap. ...	124	—129	+ 2
Oxford, cons. ord.	198	—208	+ 3
Plymouth & Stone., ord.	108	—113	+ 1
Primitiva Holdings, ord.	12/	— 14/	+ 2s.
South Metropolitan, 3 p.c. perp. deb.	82	— 87	+ 1
Do. 5 p.c. red deb. ...	98	—103	+ 1
Tottenham, 5 p.c. pref.	108	—113	+ 1
Do. 5½ p.c. irred. deb. ...	118	—123	+ 3
United Kingdom, 3½ p.c. red. deb.	93	— 98	+ 1
Do. 5 p.c. pref.	108	—113	+ 5
Wandsworth, 5 p.c. irred. pref. ..	121	—126	+ 1

GAS PRODUCTS PRICES

April 10

London.—There are no changes to report in the prices of Coal Tar products.

Provinces.—Average prices for gas-works products this week are: Pitch, 100s. per ton; toluole, naked, North, 90's, 2s. 4d. to 2s. 6½d. per gall.; pure, 3s. 2½d. Prices for carbolic acid 60's anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil are controlled by Government Orders. Prices for road tar are increased by one penny per gall. by S. R. & O., 1947, 177.

Scotland.—Production continues to find a ready outlet.

Refined tar.* Yield to the distiller is 6d. per gall. ex works, naked. Creosote oil. Timber preserving quality,* 5½d. to 6½d. per gall.; hydrogenation oil,* 5½d. per gall.; low gravity or virgin oil,† 7½d. to 7½d. per gall.; benzole absorbing oil, 6½d. to 8d. per gall. Refined cresylic acid is 3s. 6d. to 4s. 6d. per gall. ex works, naked, according to quality. Crude naphtha,† 8d. to 10d. per gall. Solvent naphtha.* Basic maximum prices delivered in bulk, 90/160 grade 2s. 10d. per gall. and 90/190 heavy naphtha, unrectified, 2s. 0½d. per gall.; rectified, 2s. 4d. per gall. Pyridine,† 901/60 grade 15s. per gall., and 90/140 grade 17s. per gall.

* Price controlled. † Uncontrolled.

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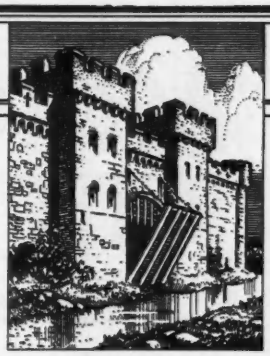

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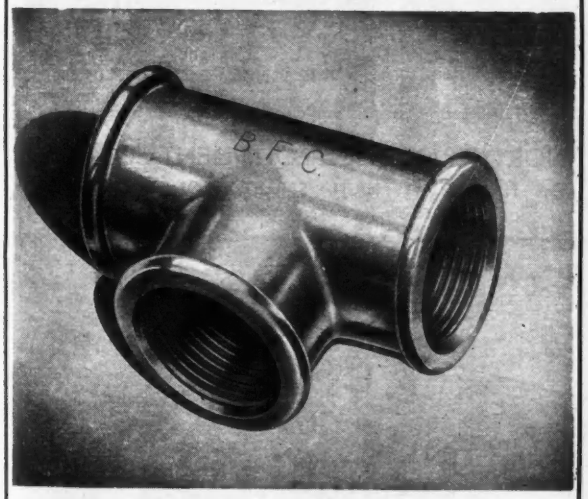
Malleable Iron Fittings. Tested White Heart.



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10D. Price Unchanged per large tin, retail

Supplied in ¼-cwt. drums and 14-lb. tins extra strong for use in Stove Shops

THE KLEENOFF Co., 33, St. Mary-at-Hill, LONDON, E.C. 3

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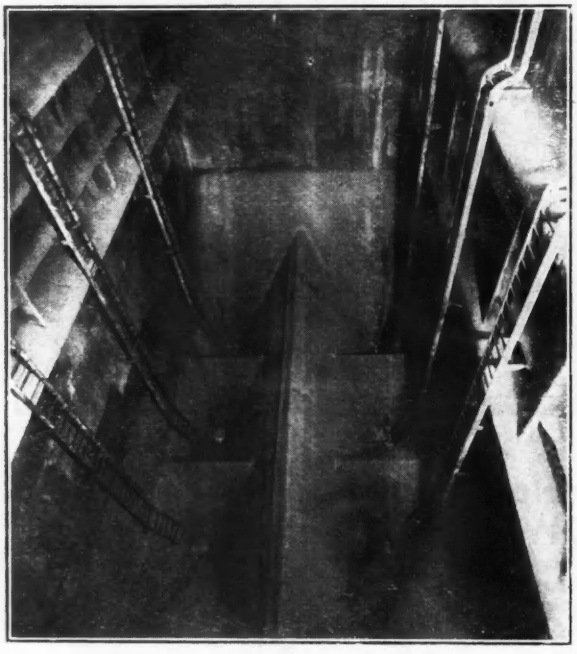
Gunite is PROTECTION against abrasion



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intricate bending WITH INFINITE EASE

The modern Hilmor Bender possesses a degree of efficiency, adaptability and fitness for the job to be found in no other tube bending machine on the market. Consider the merits of the 'G L' Plumbers' and Gas Fitters 'models :

- **Completely portable machines requiring no fixing or bolting down and available where they're wanted most—right on the job.**
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- **All machines fitted with tube grips and equipped, according to model, to bend from ¼" to 1½" dia. light gauge copper tube.**

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These Wire Broom Heads are Hand Made and are especially manufactured for use where a Heavy Duty wire broom head is required. The Leading Gas Companies, Road Making Contractors, Colliery Undertakings, Iron and Steel Manufacturers and Engineering Works are finding these Wire Broom Heads give very satisfactory service. Delivery is Ex-Stock and immediate attention is given to orders.

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Carriage paid on 3 or more.
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Foundry Brushes also available, prices on application.

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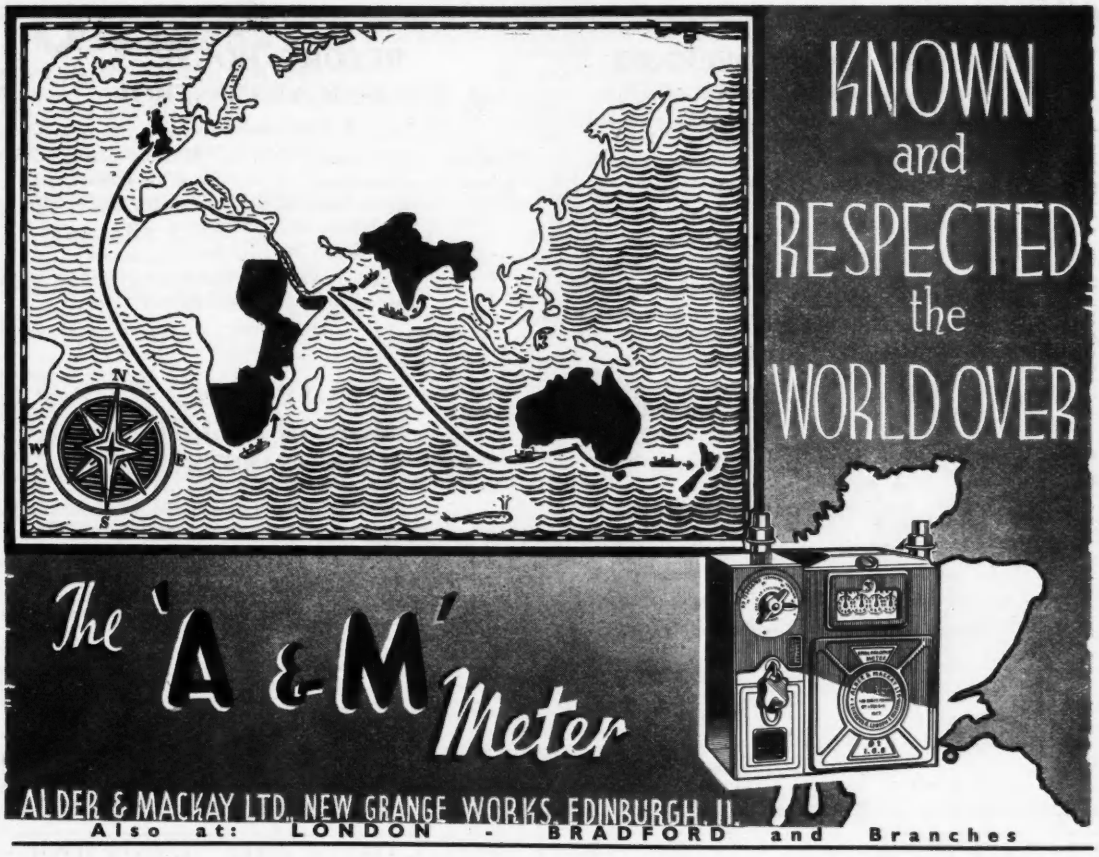

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A study of pressure control for the Gas Engineer and student.

Demy 8vo; 200 pp.; 128 illustrations; Tables and formulæ.

Price **22s. 6d.** *post free.*

✷

CARBONIZATION IN HORIZONTAL RETORTS

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M.I.C.E., M.I.Mech.E., M.Inst.Gas E., F.Inst.F.

Invaluable to all who work in, or are responsible for the operation of, horizontal retort-houses.

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A handy digest of information on good supervision, written primarily for the Gas Industry, but equally useful to the Foremen, Supervisors and Inspectors of all public utilities.

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The work covers, in compact form, the operations which form the basis of the manufacture of coal gas in the retort-house, and is essentially for the gasworks chemist or technical retort-house superintendent.

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GAS JOURNAL. (Weekly.)

Subscription Rates: Home and Empire: 45/- per annum; Foreign: 52/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

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CONTRACTS OPEN

SOWERBY BRIDGE URBAN DISTRICT COUNCIL

(GAS DEPARTMENT.)

TENDERS are invited for RE-SETTING three beds of HORIZONTAL RETORTS.

Full particulars may be obtained from the Engineer and Manager, Gas-works, Mearclough, Sowerby Bridge, Yorkshire.

Tenders, in plain sealed envelopes, endorsed "Re-setting," to be addressed to the undersigned and received not later than Friday, May 7, 1948.

A. WOMERSLEY,
Clerk to the Council.

23, Wharf Street,
Sowerby Bridge.

CITY OF CARLISLE

(GAS DEPARTMENT.)

THE Corporation invite Tenders for the supply and delivery of 120 gall. of BATTLESHIP GREY PAINT for the painting of Gasholder, and 75 gall. of ALUMINIUM PAINT for the painting of street lamps and pillars.

A half-pint sample of each paint offered to be sent to the Gas Engineer, Gas-works, Carlisle. Tenders in plain sealed envelopes endorsed "Tender for Paint," must be delivered to the Town Clerk, Carlisle, not later than 12 noon on Wednesday, May 5, 1948.

The Corporation do not bind themselves to accept the lowest or any tender, and persons tendering must do so at their own cost.

H. D. R. ROBERTSON,
Town Clerk.

April 10, 1948.

PLANT FOR SALE & WANTED

WANTED IMMEDIATELY. 4/5,000 cu.ft. per hour STATION METER, certified correct, 6 in. connexions. Box No. 9723, "GAS JOURNAL," 11, Bolt Court, Fleet Street, London, E.C.4.

FOR Sale. One National GAS ENGINE, 9 h.p., twin fly wheels, new condition, with tanks and pipes. £65 or offer.—No. 9724, "GAS JOURNAL." 11, Bolt Court, Fleet Street, London, E.C.4.

FOR SALE.

TANKS. TANKS. TANKS.

CLOSED CYLINDRICAL.

One off 30 ft. by 7 ft. 6 in. Five off 28 ft. by 7 ft. 6 in. One off 37 ft. by 5 ft. One off 30 ft by 5 ft. 6 in. One off 30 ft. by 5 ft. One off 10 ft. by 6 ft. 9 in. Two off 13 ft. by 5 ft. One off 18 ft. by 5 ft.

OPEN CYLINDRICAL.
One off 10 ft. by 8 ft.

CLOSED RECTANGULAR.
One off 25 ft. by 9 ft. 6 in. by 5 ft. Five off 14 ft. 6 in. by 7 ft. by 9 ft. One off 6 ft. by 3 ft. 9 in. by 2 ft. 6 in. One off 6 ft. 6 in. by 2 ft. by 2 ft. Two off 5 ft. 6 in. by 2 ft. by 2 ft. One off 2 ft. 6 in. by 2 ft. by 2 ft.

OPEN RECTANGULAR.
One off 9 ft. by 3 ft. 6 in. by 4 ft. One off 7 ft. 9 in. by 4 ft. by 4 ft. Forty off 6 ft. 6 in. by 4 ft. 2 in. by 4 ft. 7 in. Six off 5 ft. by 5 ft. by 7 ft. One off 10 ft. by 3 ft. by 3 ft.

LORRY MOUNTING OIL TANKS.
Two off Eight-compartment Oil Tankers, 20 ft. long, 8 ft. wide, 5 ft. 2 in. high.
One off Four-compartment Oil Tanker, 14 ft. 6 in. long, 6 ft. wide, 3 ft. 10 in. high.

JAMES N. CONNELL, Phoenix and Clifton Works, Coatbridge, Scotland. Phone: Coatbridge 1121 (5 lines).

CITY OF MANCHESTER

(GAS DEPARTMENT.)

PLANT FOR SALE.

THE Gas Committee invites offers for the purchase and removal of two sets of Waller Twin Drum Four-blade COMPRESSORS, driven by Waller vertical steam engine.

Capacity, 80,000 cu.ft./hour.
Speed, 120 r.p.m.
Outlet gas pressure, 5 lb./sq. in.
Vertical steam engine, 12 in. diameter cylinder by 18 in. stroke.
Working steam pressure, 65 lb./sq. in.

The above sets are complete with all the necessary fittings, including valves, governors and relief valves, &c., and may be seen working by arrangement with the Chief Engineer, Gaythorn Works, Medlock Street, Manchester, 15.

Form of tender, together with official envelope for return, may be obtained on application to the Commercial Manager and Secretary, Gas Department, Town Hall, Manchester, 2.

Sealed tenders in the envelope provided, addressed to the Chairman of the Gas Committee, and endorsed "Compressors," must be delivered at the Gas Office, Town Hall, Manchester, 2, not later than 5 p.m. on Friday, April 30, 1948.

The Committee does not bind itself to accept the highest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
Manchester, 2.
April, 1948.

WANTED. Four 14 in. CAST IRON VALVES, flange. Price and particulars to ROBERT COWIE, M.I.Gas E., Gas-works, Hawick, Scotland.

PHONE 98 STAINES.

AIR RECEIVER, 18 ft. 6 in. by 4 ft., 100 lb. Broom & Wade TWIN COMPRESSOR, Type D21.
Cylindrical ENCLOSED TANK, 30 ft. by 7 ft.
34 KW. STEAM GENERATING SET, 220 volts D.C.
Robey H.S. VERTICAL STEAM ENGINE, 9 in. by 7 in.
LANCASHIRE BOILER, 24 ft. by 8 ft., 120 lb.
Weir type VERTICAL FEED PUMP, 2,000 g.p.h.
HARRY H. GARDAM & Co., LTD., Staines.

APPOINTMENTS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50, inclusive, or a woman between the ages of 18 and 40, inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1947, or the vacancy is for employment excepted from the provisions of that Order.

WANTED. GAS FITTER. Union rate of pay. Single man preferred owing to housing difficulties. Apply the MANAGER, The Castletown Gas Light Co., Ltd., Castletown, Isle of Man.

CARBONIZING SUPERINTENDENT required for 350 millions works in Midlands. Applicant must be fully experienced in control of continuous vertical retort settings and C.W.G. plant. Full particulars of age, experience and present engagement should be sent to the undersigned.

THOS. WATSON,
Engineer and General Manager.

The Rushden District Gas Company,
Rushden,
Northants.

BOROUGH OF CAERNARVON

(GAS DEPARTMENT.)

APPOINTMENT OF GAS ENGINEER AND MANAGER.

APPLICATIONS are invited for the above appointment.

Applicants must be experienced in the control of a gas undertaking, including manufacture, purification and distribution of gas, control of consumers' appliances, sales representation, &c., and should be Corporate Members of the Institution of Gas Engineers (or hold the Higher Grade Certificate in Gas Engineering (Manufacture)).

The salary will be in accordance with Grade VI of the A.P.T. Division of National Scales (£595-£660).

The appointment is subject to the provisions of the Local Government Act, 1937.

A house will be available for the successful candidate.

Applications, stating age, experience and qualifications, accompanied by *copies* of three recent Testimonials, must be received by the undersigned not later than April 19 next.

W. P. DAVIES,
Town Clerk.

Briggs Chambers,
Caernarvon.
April 6, 1948.

COUNTY BOROUGH OF BLACKPOOL

(GAS DEPARTMENT.)

SHIFT ENGINEER.

APPLICATIONS are invited for the vacancy of SHIFT ENGINEER at a salary in accordance with A.P. & T. Division, Grade III, £450 x £15—£495.

Candidates must have practical experience in the operation and control of a large works in the absence of the day supervising staff. Technical qualifications are essential.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, furnishing full particulars, should be forwarded to the Gas Engineer and General Manager, Princess Street, Blackpool, not later than April 30, 1948.

Testimonials need not be submitted in the first instance, but will be required by those short-listed.

The above position is excepted from the provisions of the Control of Engagement Order, 1947.

Canvassing, directly or indirectly, or the submission by candidates of Testimonials or recommendations from members of the Council will disqualify the candidates.

TREVOR T. JONES,
Town Clerk.

Town Hall,
Blackpool.
March 31, 1948.

(*Classified advertisements continued on Supplement* 6)

APPOINTMENTS VACANT (ctd.)

LONDON COUNTY COUNCIL

REQUIRED at Westminster Technical College, Vincent Square, S.W.1, as soon as possible full-time SENIOR ASSISTANT in the Engineering Department to teach the main subjects of Gas Manufacture/Supply up to Higher Grade standard and the related subjects of Physics, Mathematics and Chemistry to senior day and evening students.

Applicants should be gas technologists with industrial experience, good professional qualifications and/or degree in fuel technology, physics or chemistry, with adequate teaching experience in a technical college. Salary scale, subject to the application of the 1948 Burnham Award, £700 x £25—£800, plus London allowance of £36 or £48 and increments for approved degree and training.

Application forms (stamped, addressed foolscap envelope necessary) from the PRINCIPAL at the College, returnable within 10 days of publication.

CORK GAS WORKS

CHIEF ENGINEER AND MANAGER.

THE Cork Gas Consumers' Company invites applications for the position of CHIEF ENGINEER AND MANAGER of their works.

Applicants must possess recognized professional qualifications and be fully experienced both in production and distribution of gas.

Commencing salary £1,100 a year and free house.

Applications are to be submitted on the prescribed form (obtainable from the Secretary) and must be posted so as to reach the Secretary not later than May 22, 1948.

All communications in this matter will be treated as confidential.

S. DOYLE,
Secretary.

Cork Gas Consumers' Co.,
72, South Mall,
Cork.
April 10, 1948.

STRETFORD AND DISTRICT GAS BOARD

APPLICATIONS are invited for the position of DEPUTY WORKS GENERAL FOREMAN. Appointment designated in Grade A.P.T. II with commencing salary not less than £420 per annum according to experience. A good house is available at a reasonable rent.

Applicants should not exceed 45 years of age, have good all round gas-works experience, especially of horizontal retorts, be good organizers and strict disciplinarians.

Applications, together with *copies* of two recent Testimonials, are to be delivered to the undersigned not later than April 22, 1948.

JOHN GRAYSTON,
Engineer, General Manager and Clerk.

Gas-works,
Longford Road,
Stretford, Manchester.

THE WATFORD AND ST. ALBANS GAS COMPANY

APPLICATIONS are invited for the following appointments at the St. Albans Works of the Company.

ASSISTANT WORKS ENGINEER.

Applicants must be Corporate Members of the Institution of Gas Engineers, capable of assisting the Works Engineer in all his duties and in his absence of assuming control. The post offers scope to a young man of ability. The works is producing gas at the rate of 2,000 million cu.ft. per annum and is being rapidly expanded.

The salary offered is not less than £700 per annum, and a house within easy reach of the works will be provided, rent and rates free.

SENIOR WORKS CHEMIST.

Candidates should possess a professional qualification and have had works experience, preferably in the Gas Industry.

The salary offered is not less than £500 per annum.

Applications should be addressed to the undersigned and reach him not later than April 22.

T. C. BATTERSBY,
General Manager and Chief Engineer.

Radiant House,
Clarendon Road, Watford.

ASSISTANT CHEMISTS required by old- established firm developing new processes for the manufacture of synthetic organic chemicals at their new works in the Midlands. Excellent opportunities are offered for young men of drive and ability. Experience in gas analytical work and a knowledge of manufacture of synthetic organic chemicals desirable but not essential. Salary £350-£450 per annum. Apply in confidence, giving full particulars of qualifications and experience, to No. 9722, "GAS JOURNAL," 11, Bolt Court, Fleet Street, London, E.C.4.

COMMERCIAL GAS COMPANY

ASSISTANT ACCOUNTANT.

APPLICATIONS are invited for the position of ASSISTANT ACCOUNTANT.

Applicants, preferably under 35 years of age, must be qualified accountants, either Chartered or Incorporated, experienced in modern office methods, costing and machine accounting, and able to control the work of a small office. Previous experience of the Gas Industry is not essential.

The commencing salary will be £600 per annum, but a salary in excess of this figure would be paid to an applicant of outstanding ability. There is a contributory pension scheme.

Applications, stating age, qualifications, experience, &c., and the names of two persons to whom the Company may refer for Testimonials if necessary, should be addressed so as to reach the undersigned not later than April 30, 1948

E. H. HARMAN,
General Manager and Secretary.

Harford Street,
Stepney,
London, E.1.

NEATH CORPORATION

(GAS-WORKS DEPARTMENT.)

WORKS CHEMIST.

APPLICATIONS are invited for the position of WORKS CHEMIST at a consolidated salary of £315 x £15 to £360 in Miscellaneous I Grade of the National Scales.

Applicants should have a knowledge of the chemical control of the carbonizing process in vertical retorts, also of carburetted water gas, benzole extraction, gas dehydration, and wet and dry purification. They should also be capable of carrying out the routine tests attendant upon the efficient working of such plant.

Experience in draughtsmanship, although not essential, would be considered an advantage.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, stating age, qualifications, training and experience, together with *copies* of three recent Testimonials, should be forwarded to the undersigned not later than April 30, 1948.

ALFRED E. I. CURTIS,
Town Clerk.

April 6, 1948.

DERBY GAS LIGHT AND COKE COMPANY

INDUSTRIAL GAS ENGINEER.

APPLICATIONS are invited for the position of INDUSTRIAL GAS ENGINEER. Applicants must be of good education and address and be familiar with the general application of heat in industrial processes, be able to design burner equipment and general layouts for non-standard gas applications, and capable of preparing working drawings. Selling experience and ability to recognize potential industrial gas development is essential.

The successful applicant will be required to take charge of the Company's industrial furnace workshops and production in heat treatment shops. A knowledge of modern alloy steel specifications would be an advantage.

The applicant should hold the Higher Certificate in Gas Engineering (Supply) of the Institution of Gas Engineers or have equivalent combustion engineering qualifications, and should have a sound practical training in either metallurgy or mechanical engineering.

Salary would not be less than £700 per annum.

Applications, stating age, qualifications and experience, together with the names of three persons from whom references can be obtained, should be addressed to the undersigned, to arrive not later than May 1, 1948.

C. H. MOSEDALE,
Secretary.

Friar Gate,
Derby.

PRESTON GAS COMPANY

HOME SERVICE ADVISER AND DEMONSTRATOR.

APPLICATIONS are invited for the above appointment, at a salary of £350 per annum.

Applicants must be capable of conducting demonstrations in cookery, laundry and other home services and should possess a recognized diploma in domestic science.

Applications, stating age and experience, with *copies* of recent Testimonials, to be addressed to the MANAGING DIRECTOR not later than April 30, 1948.

Fishergate,
Preston.

CITY AND ROYAL BURGH OF EDINBURGH

(GAS DEPARTMENT.)

APPLICATIONS are invited for the position of ASSISTANT SALES SUPERINTENDENT.

Salary scale £490, rising to £550 per annum, plus current annual war bonus of £60.

Applicants for this post should be in possession of the Institution of Gas Engineers Higher Grade Certificate in Gas Supply or equivalent qualification, and have good experience of showroom and district sales and a sound knowledge of sales office procedure.

Applications, giving fullest details of education, training and experience, together with names of not more than three persons from whom references could be obtained, should be addressed to DUNCAN D. MELVIN, Esq., Engineer and Manager, Corporation Gas Department, 15, Calton Hill, Edinburgh, 1, not later than Monday, April 19, 1948.

BRISTOL GAS COMPANY

WORKS TECHNICAL ASSISTANT.

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT at a commencing inclusive salary of £425 per annum.

Candidates should possess a Certificate of the Institution of Gas Engineers, preferably in Higher Grade (Manufacture) and/or should have experience in the control and operation of vertical and horizontal retorts, carburetted water gas plants and be capable of supervising all other manufacturing processes.

Candidates should not be more than 35 years of age, and the selected candidate will be required to pass a medical examination and contribute towards the Company's superannuation scheme.

A modern flat at reasonable rent is available.

Applications, endorsed "Technical Assistant," giving full details of age, training, qualifications and experience, together with *copies* of not more than two recent Testimonials, to be sent to the undersigned not later than Monday, May 3, 1948.

JAMES CARR,
Engineer and General Manager.

Bristol Gas Company,
Radiant House, Bristol, 1.
April 8, 1948.

BRISTOL GAS COMPANY

CHIEF FOREMAN, MAINS DEPARTMENT.

APPLICATIONS are invited for the above position. Applicants should have a thorough practical and theoretical knowledge of high and low pressure main and service laying. Ability to organize and control labour is essential.

If desired, a modern flat is available at reasonable rental.

Salary £420 per annum inclusive.

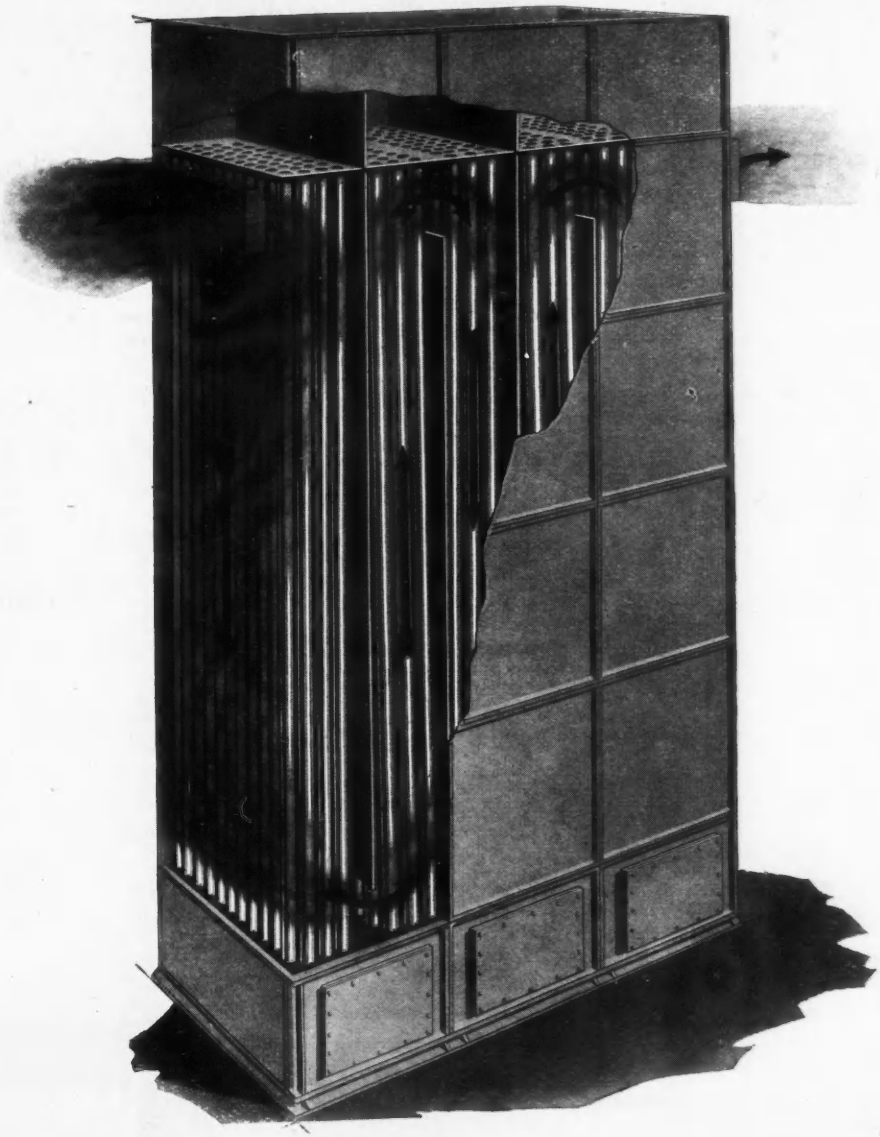
Applications, stating age, training, experience and qualifications, together with *copies* of two recent Testimonials, should be sent to the undersigned not later than April 30, 1948.

This advertisement is inserted by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.

JAMES CARR,
Engineer and General Manager.

Radiant House,
Bristol, 1.

VERTICAL TUBE CONDENSERS



A sketch impression of the interior of a Holmes Multi-pass Vertical Tube Condenser. Built on sound basic principles securing high velocity of movement, and high efficiency of performance yet allowing good access for tube cleaning and replacement.

Individual design for each enquiry is important.

FOUNDED 1850
HOLMES
HUDDERSFIELD

Telephone Nos. Huddersfield 5280-6 London Victoria 9971-3 Birmingham Midland 6830

C292

"KEITH-BLACKMAN"

FANS *for every purpose*

for which fans can be employed profitably in or by the Gas Industry

VENTILATION

GAS BOOSTING and EXHAUSTING

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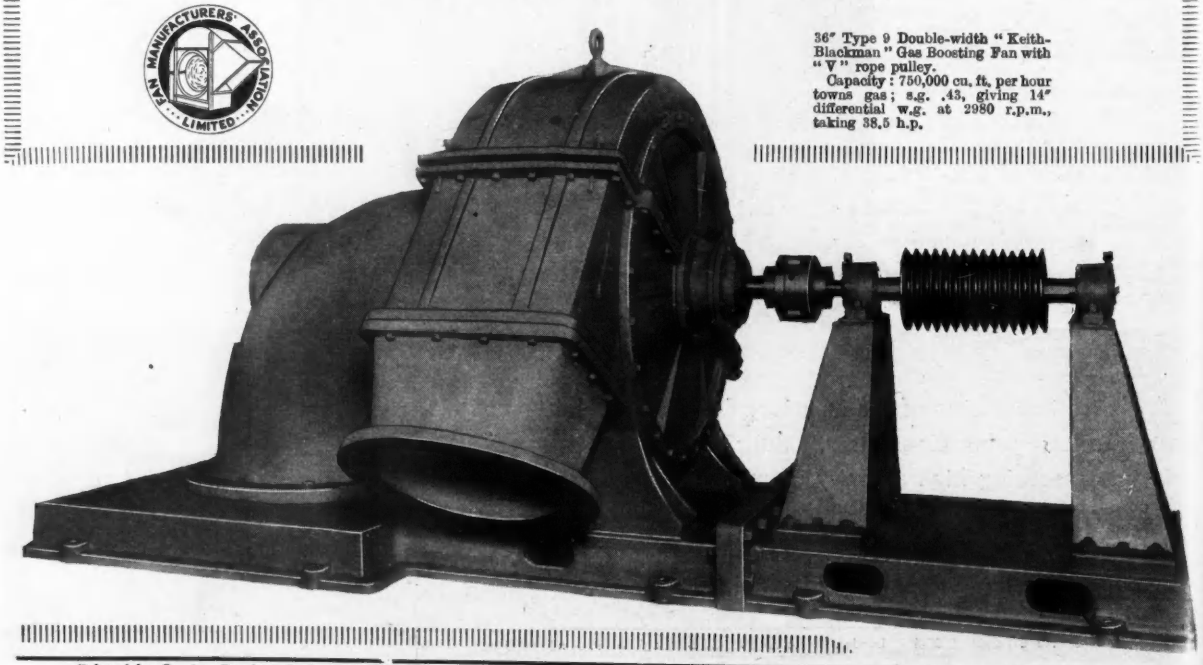

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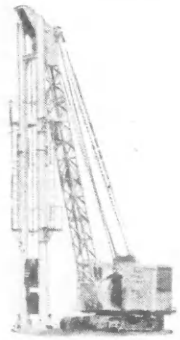

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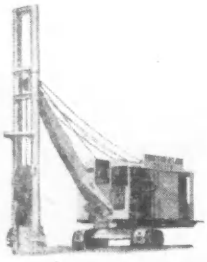

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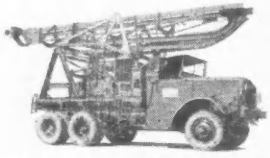

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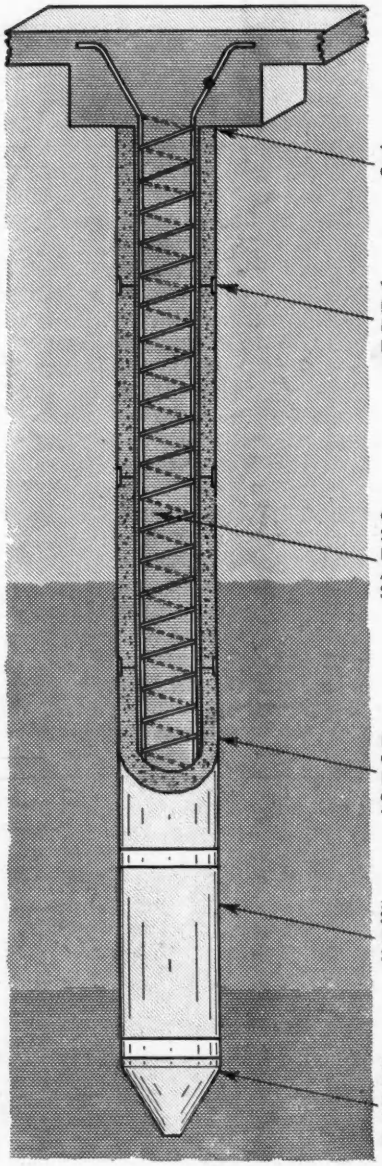
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